National Weather Service
Basic SKYWARN Session

Bill Sammler – Warning Coordination Meteorologist
National Weather Service – Wakefield, VA

Presentation Topics

- National Weather Service Overview & Mission
- Our Office
- Basic Severe Weather Definitions
- Lightning and Flash Flood Safety/ T.A.D.D.
- Why WE need YOU!
- CoCoRaHS
- NEXRAD/WSR-88D Radar Basics
- Reporting Severe Weather to the NWS
- NWS Products & Services – How to Stay Informed!
  - Weather.Gov/Wakefield

What Causes Thunderstorms?

  - Thunderstorm components/Review of Terms

(Short Break)

- You Make the Call…Don't be fooled!

Our office

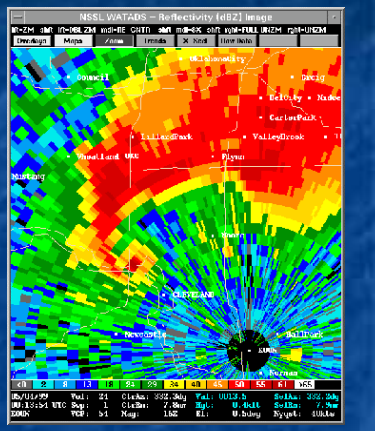
- Located on 460 just west of Wakefield
- 24/7 Operation
- 10 Forecasters
  - All degreed meteorologists
- Hydrometeorological technicians
- Interns
- Technicians
- Management/Support Staff

Inside the National Weather Service

National Weather Service weather.gov/Wakefield

Your National Weather Service

- ***Produces Weather, Water, and Climate Forecasts and Warnings:***
  - **To Protect Life and Property for All Americans**
  - **To Enhance the National Economy**



- ***Data and Products to:***
  - Government Agencies
  - **Private Sector**
  - **The Public**
  - **Global Communities**

National Weather Service **weather.gov/Wakefield**

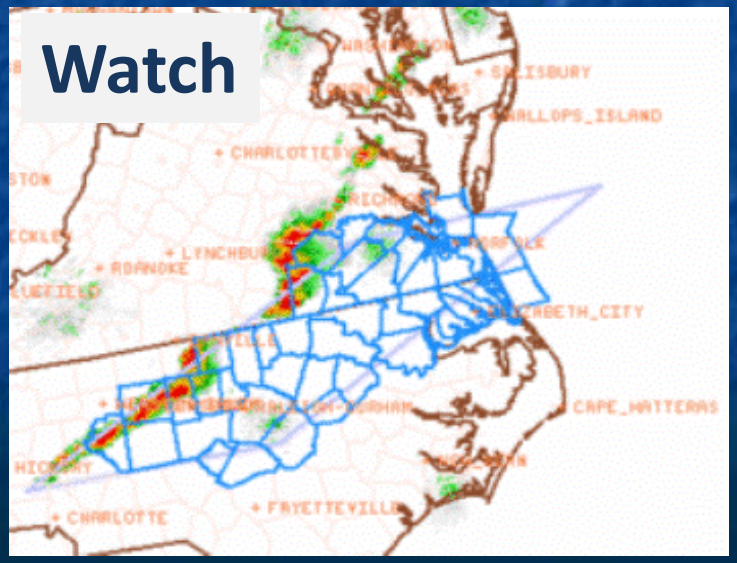
What is SKYWARN?

- Started in the 1970s
- Volunteer program with nearly 300,000 trained severe weather spotters
- Provide timely and accurate reports of severe weather to the National Weather Service

Important Definitions

Watch - Conditions are favorable for a weather hazard to occur. Plan, prepare, and be alert for warnings.

Warning - Severe weather hazard is either imminent or is occurring. Take action to protect life and property.



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Stay Alert!

Products issued by the NWS

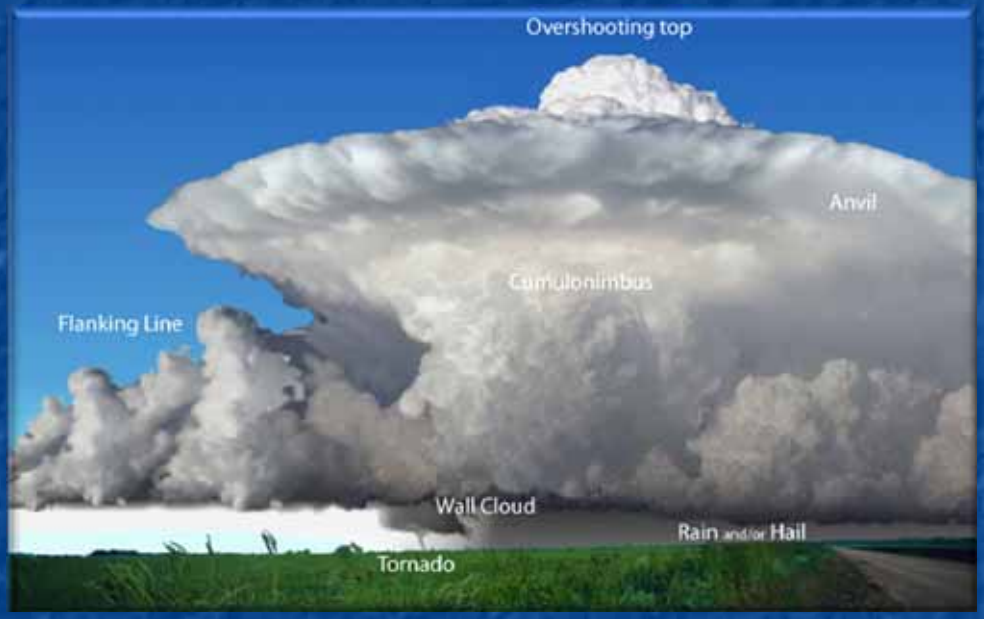
- **Outlooks**
  - 3 day Convective Outlook
  - Local hazardous Weather Outlook
  - Planning Tools (Local Briefing Page, Facebook, News, etc)

- **Watches**
  - Hazardous weather is expected in the watch area
  - Closely monitor weather conditions

- **Warnings**
  - Severe weather is imminent/occurring

Basic Storm Structure

Terms to Know



- Updraft (Inflow)
- Downdraft (Outflow)
- Shelf *or Roll* Cloud
- Wall *or Tail* Cloud
- Rain free base (action area)
- “Rotation”

Fundamental Definitions

- Tornado… A violently rotating column of air attached to a thunderstorm **and** in contact with the ground
- Funnel Cloud… A rotating, funnel-shaped cloud extending from a thunderstorm base but not touching the ground.
- Straight Line Wind…Rain cooled winds that extend horizontally under the leading edge or out ahead of a storm.
- Downburst… A strong downdraft with an out rush of damaging wind

More Definitions

What is a "Severe Thunderstorm"?

Wind 58+ mph ; i.e. strong enough to down trees, power lines, damage buildings, etc.

*** Hail 1 inch or larger ***

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Lightning Safety

- Lightning is UNPREDICTABLE!!!
- Can Strike Where it's NOT Raining
- The safest place - indoors , close windows and doors
- Your vehicle – Doors and windows ***closed***!!
- Avoid being the tallest object;
- Stay away from other tall objects such as isolated trees.
- If you can hear thunder, you are in danger of being struck by lightning. Take shelter.

Tornado Safety Rules

- BASIC RULE of Thumb – "Go Low, Stay Low"
- Seek Safe Shelter – Sturdy Bldg.
  - Mobile Homes NOT safe!
  - Basement or crawl space
  - Crouch down in lowest floor bathroom, closet or hallway
  - Use cushions, blankets, coats, etc. as protection from debris

With Saturday's tornado bearing down on his Bertie County home, Richard Bukett of 114 Kitchen Spruill Road off NC 42 near Colerain grabbed his camera and snapped this hurried photo.

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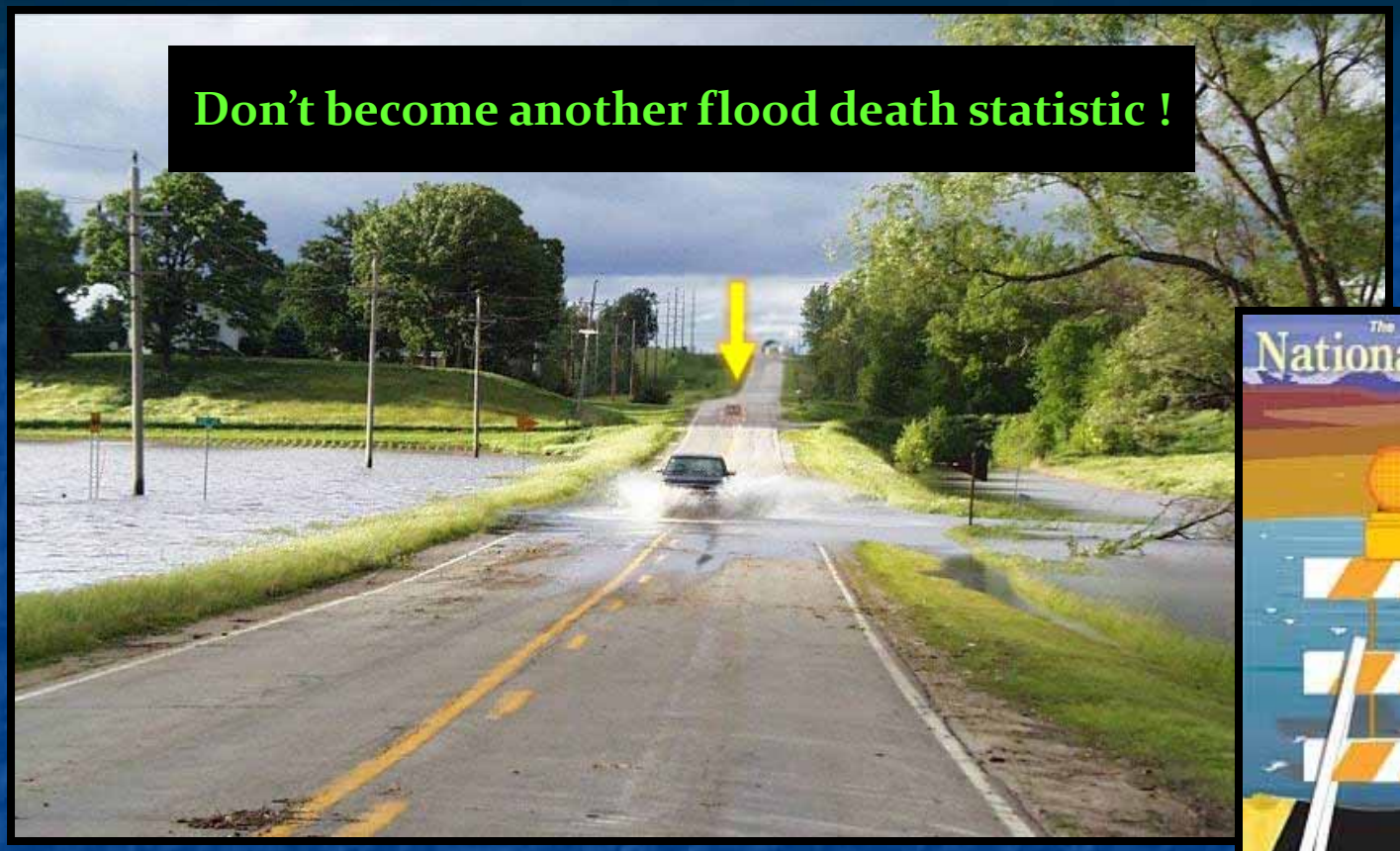
http://tadd.weather.gov



2013 - 85 flood/flash flood deaths

54% (46) related to vehicles driving into flooded waters

14% (12) people attempting to walk/swim in/through flood waters

2% (2) slipped into flood waters

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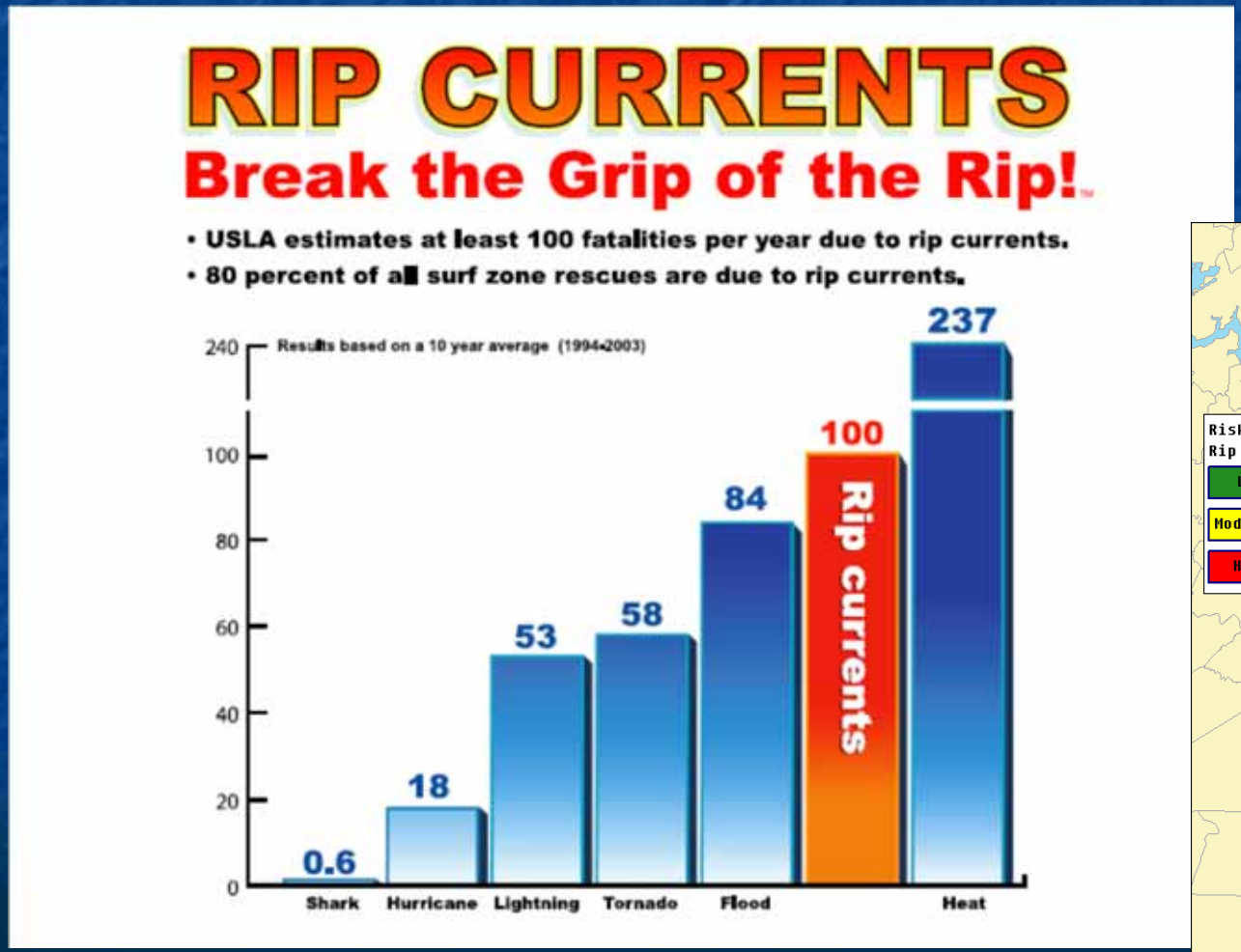
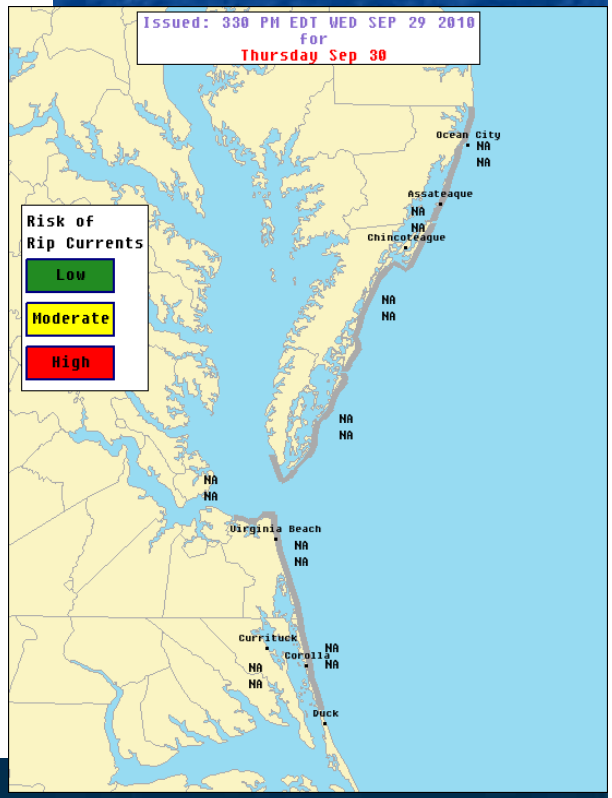
National Weather Service weather.gov/Wakefield

Rip Currents

Not really a severe weather hazard, but is responsible for several deaths each year!





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NEXRAD/WSR-88D Radar

- 158 sites across the U.S. (DOC & DOD)
- Products accessible online


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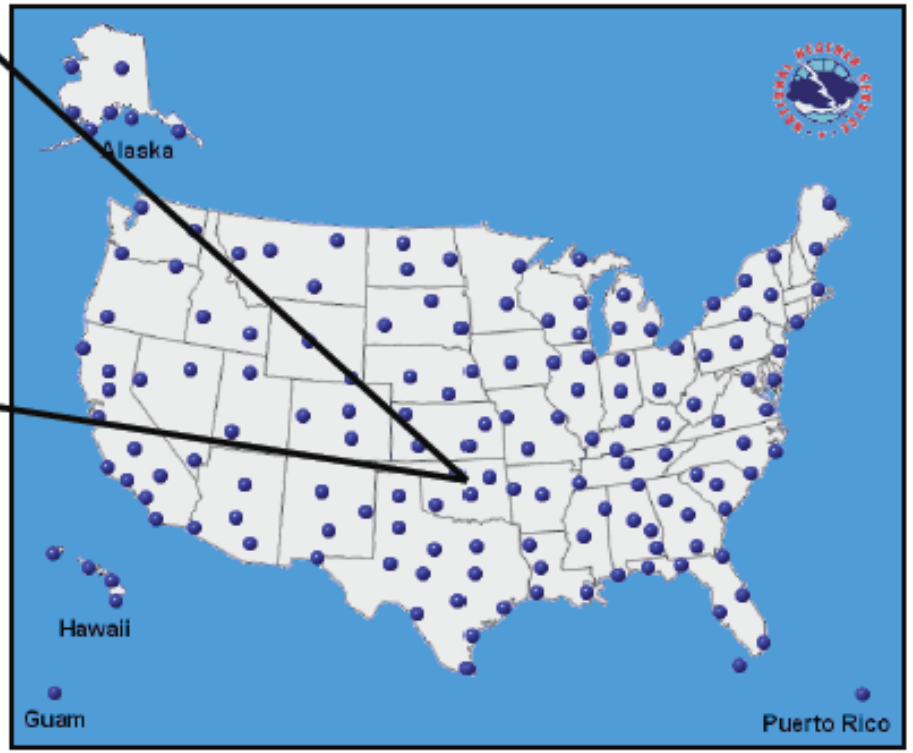
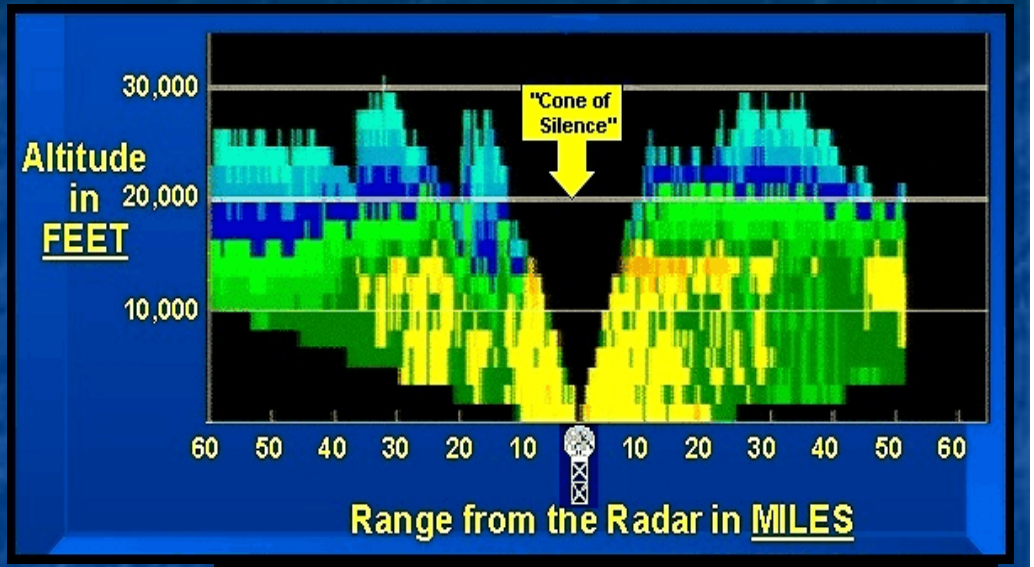
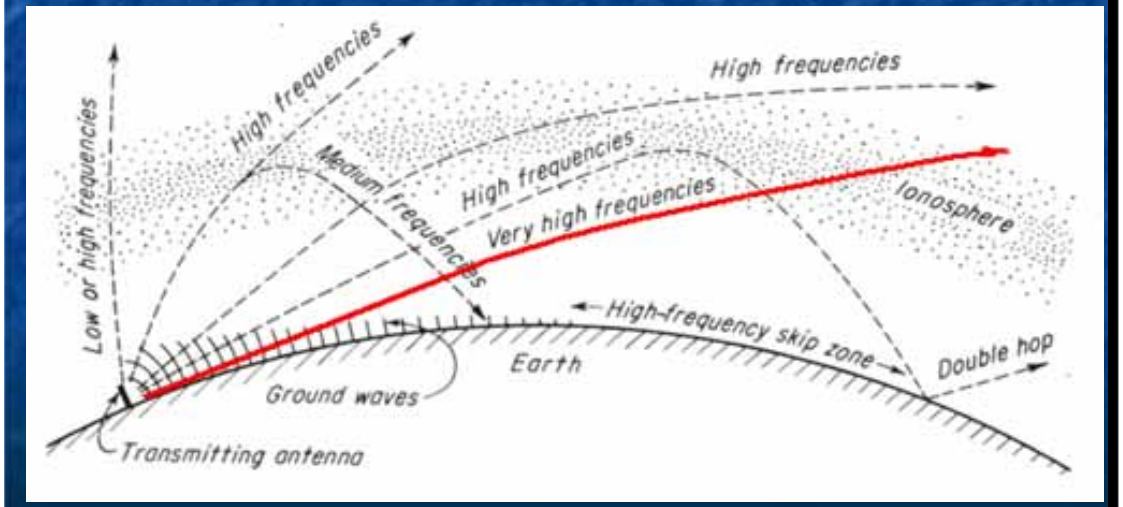


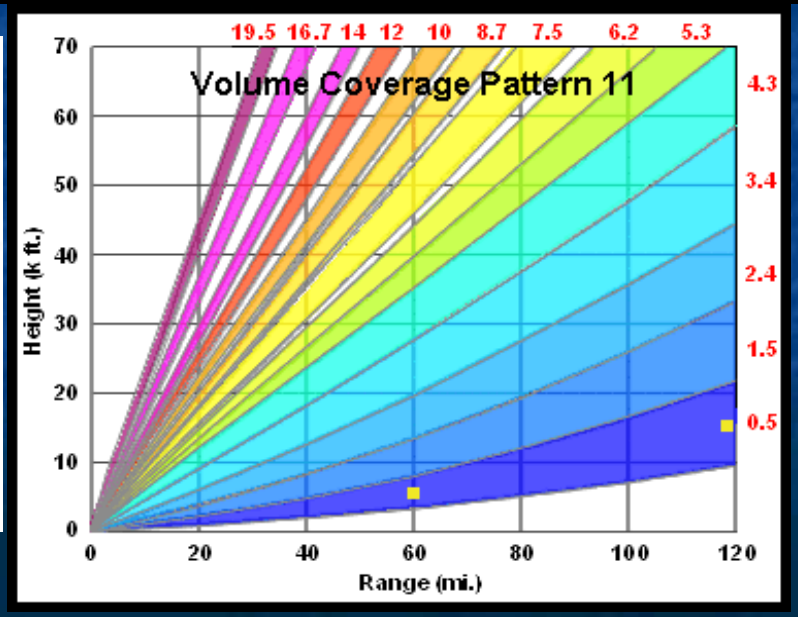
Basic Radar Operation

Radar Beam Characteristics and Beam Limitations

Radar beam height increases with distance from the radar due to curvature of the earth

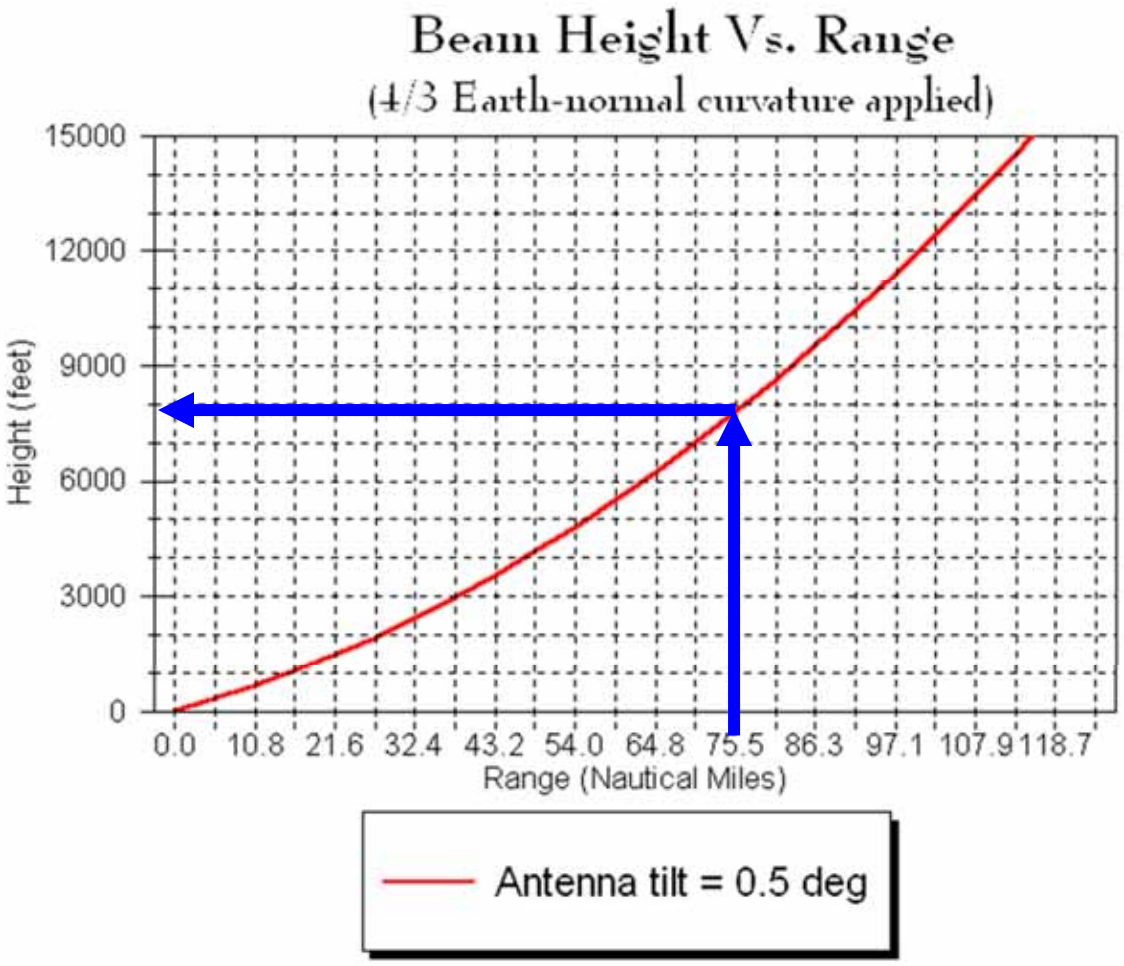






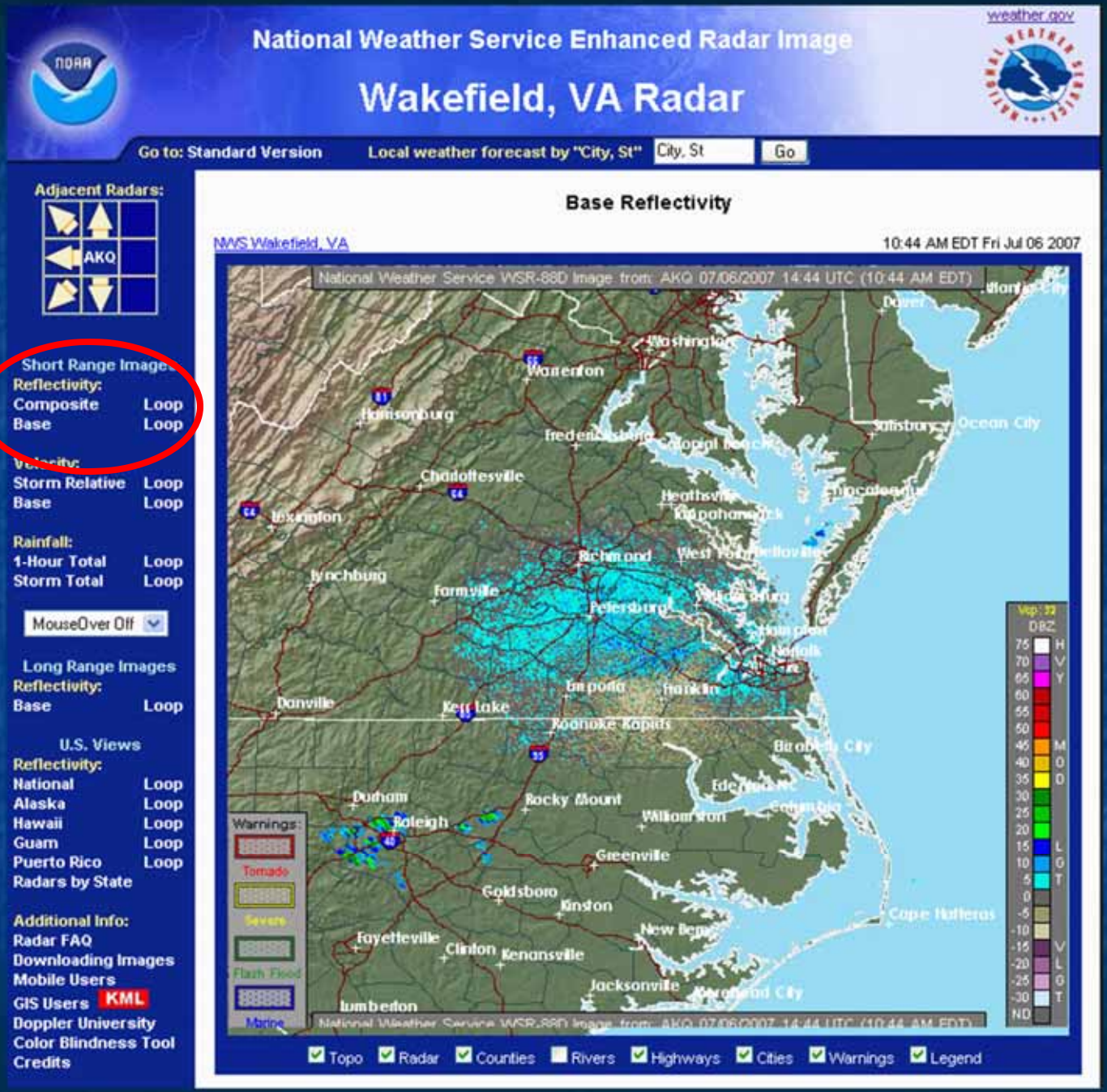
National Weather Service radar.weather.gov

Why we need spotters



(lowest elevation angle)

At a distance of 75 miles, the radar is looking ~8,000 feet above the ground.



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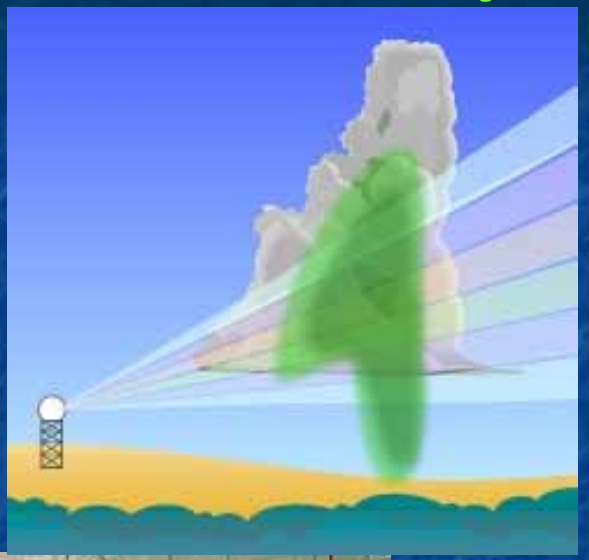
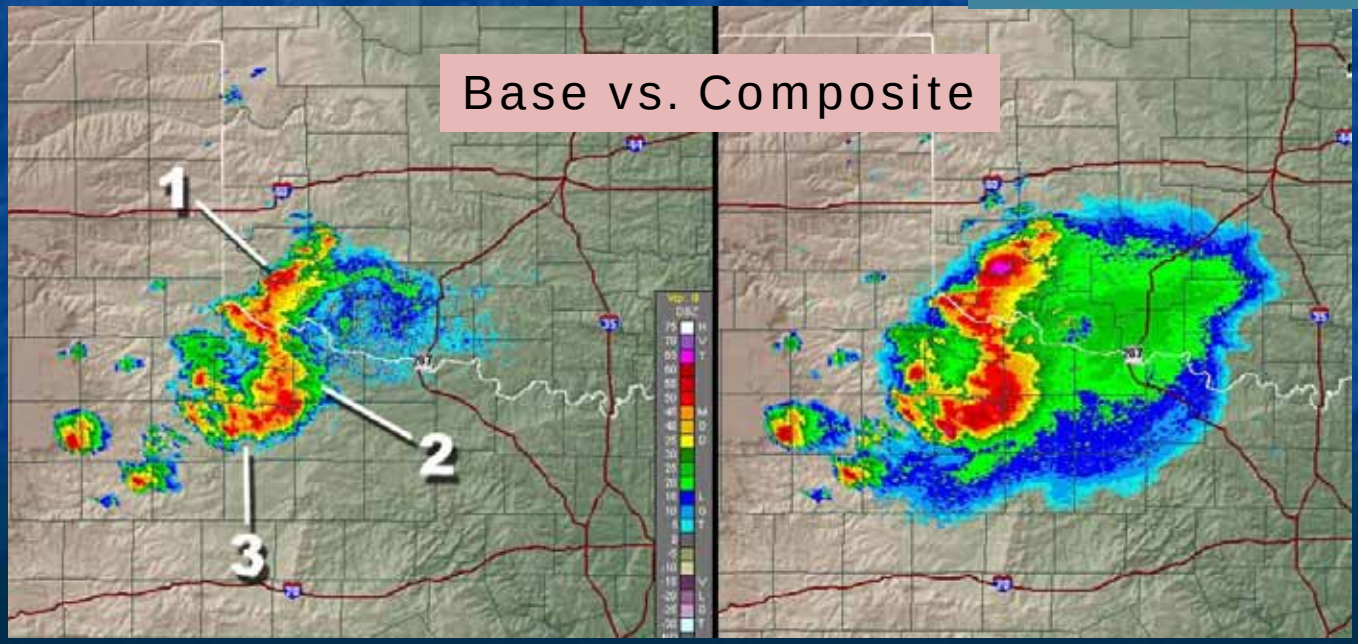
Composite vs. Base Reflectivity

- **Radar operates from 0.5° to 19.5°**
- **Base Reflectivity - 0.5° scan ONLY**
- **Composite Reflectivity – Highest of lowest 4 scan levels**





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Derecho History and a Case Study of the Ohio Valley and Mid-Atlantic Derecho

June 29-30 2012

A Derecho, defined…

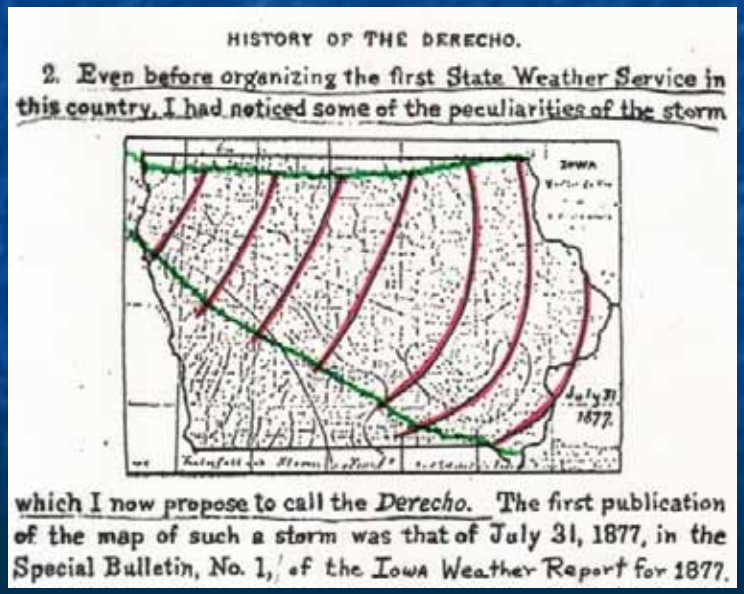
- Defined by the American Meteorological Society as:

- A widespread convectively induced Straight line Wind Storm.

- Specifically, any family of downburst clusters produced by an extratropical MCS, or mesoscale Convective System (An ensemble of thunderstorms that produces precipitation on the order of > 100 km/62 Mi. in scale.)

Derecho History

The word "derecho“ (deh-REY-cho) was coined by Dr. Gustavus Hinrichs, a physics professor at the University of Iowa, in a paper published in the American Meteorological Journal in 1888. Hinrichs chose this terminology for thunderstorm-induced straight-line winds as an analog to the word tornado.


HISTORY OF THE DERECHO.

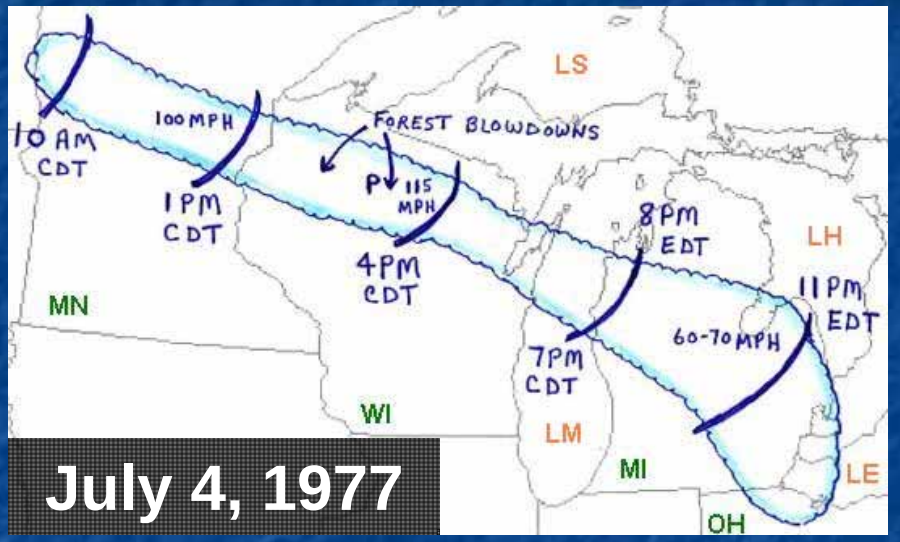
2. Even before organizing the first State Weather Service in this country, I had noticed some of the peculiarities of the storm

which I now propose to call the *Derecho*. The first publication of the map of such a storm was that of July 31, 1877, in the Special Bulletin, No. 1, of the Iowa Weather Report for 1877.

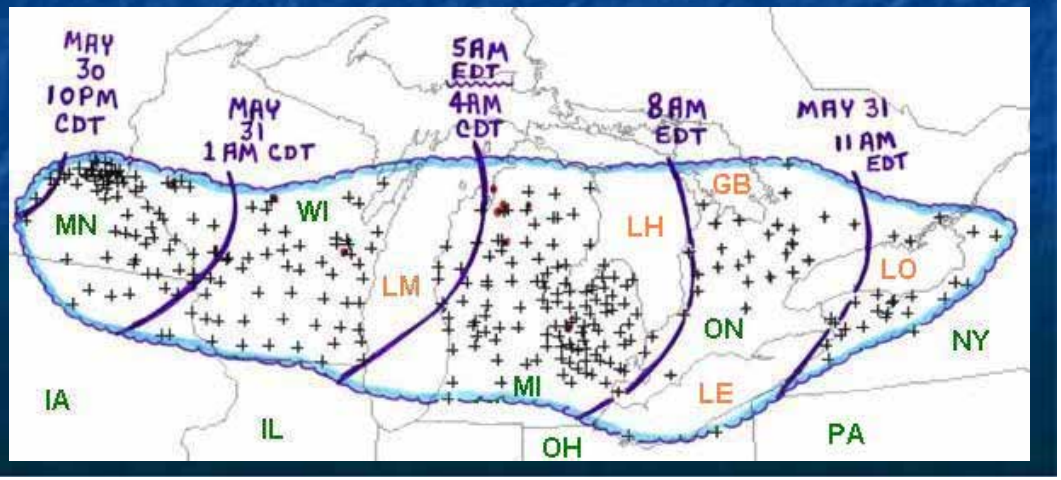
Derecho crossing Iowa on July 31, 1877

Derecho Wind Speeds

In stronger derechos, winds can exceed 100 mph. Northern Wisconsin on July 4, 1977, winds of 115 mph were measured. Derecho May 31, 1998 produced a measured wind gust of 128 mph in eastern Wisconsin, and 130 mph in Lower Michigan.

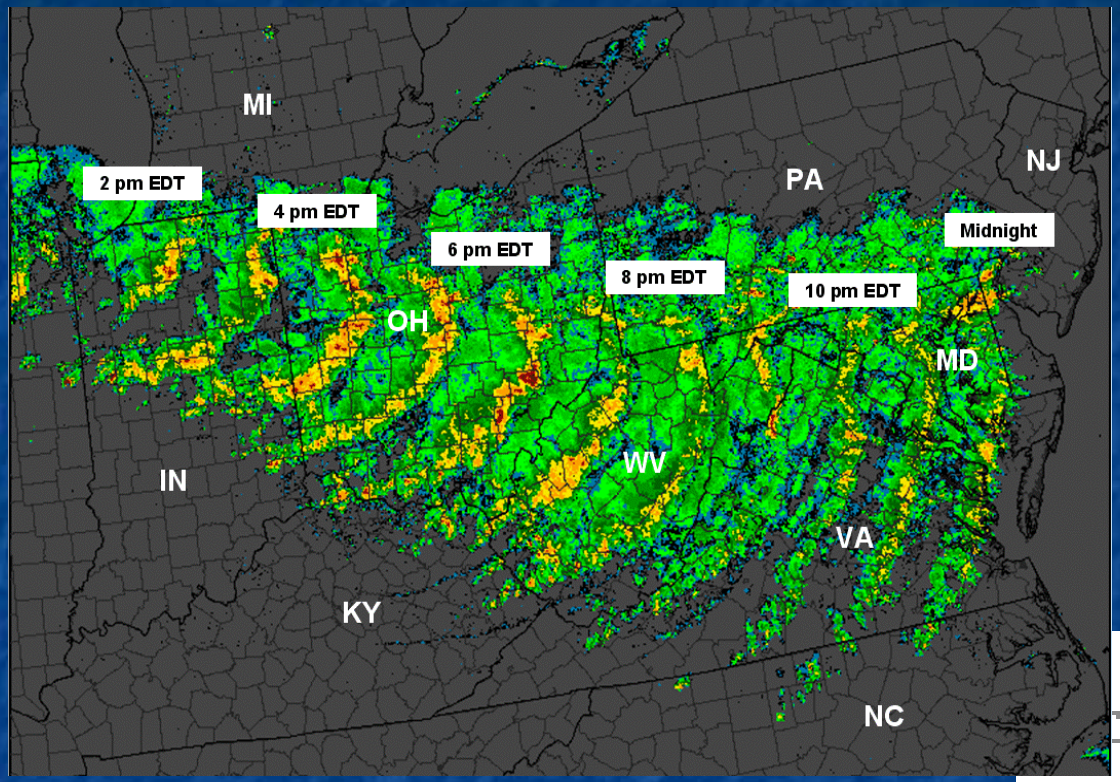


July 4, 1977



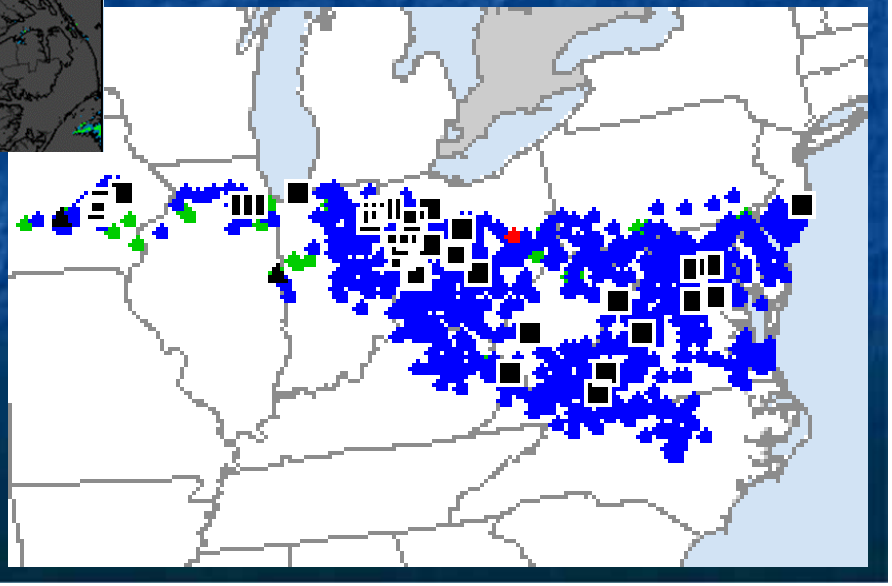
May 30-31, 1998

June 29-30th Derecho

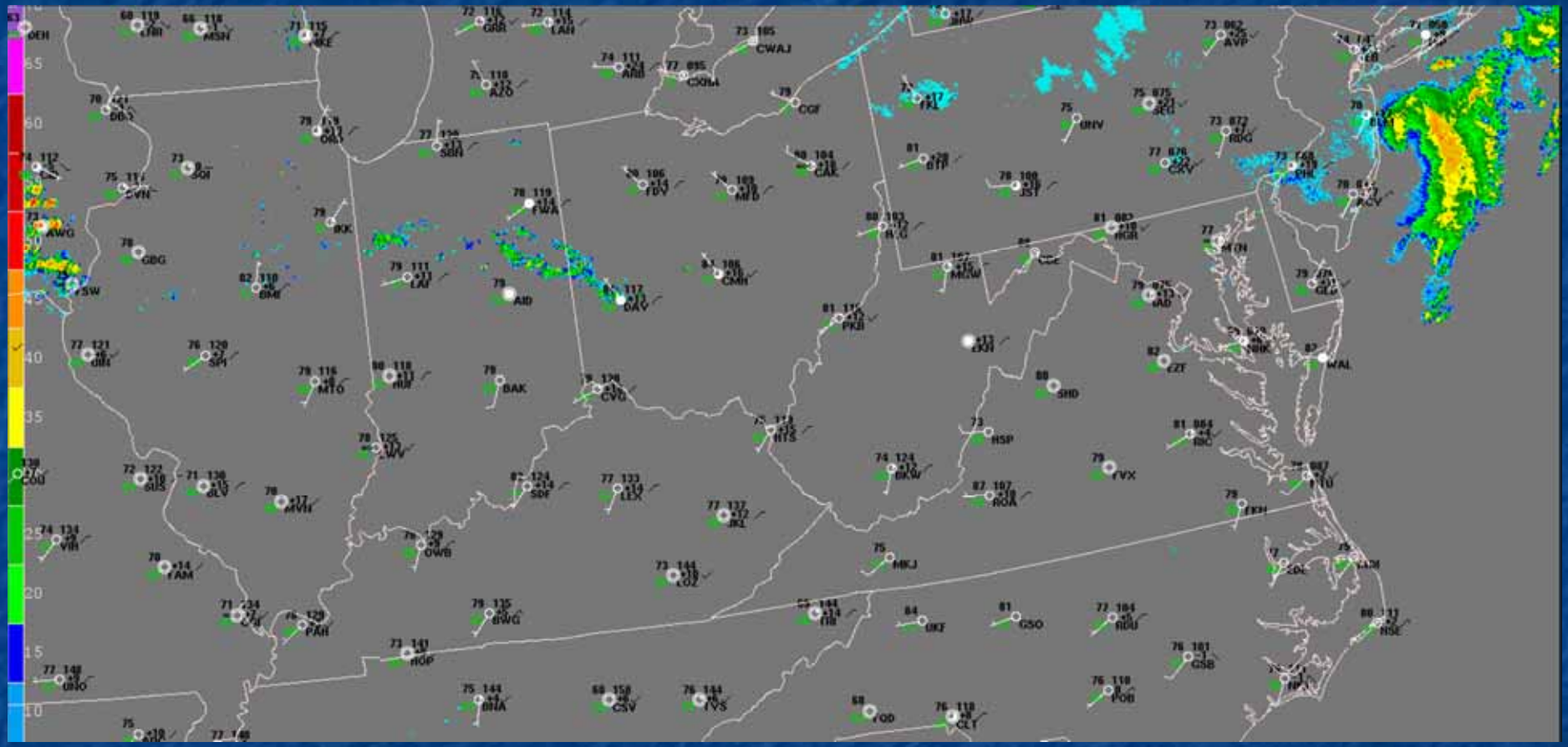


Radar Evolution

Storm Reports (SPC)



June 29-30th Derecho



Loop of Radar Evolution

CoCoRaHS

Community Collaborative Rain, Hail, and Snow Network

CoCoRaHS volunteers measure rain and snow each day and submit their reports to the NWS via an easy-to-use website.

Data are used by the NWS, media, etc.

To join, all you need is a rain gauge and a way to submit your reports on-line!

National Weather Service **weather.gov/Wakefield**

CoCoRaHS

To get started, you'll need…

- An official 4" rain gauge
- Computer with internet access
- A couple of minutes everyday to measure rain/snow
- Desire to become active in a weather related community
- We need more volunteers! Please click the CoCoRaHS logo at weather.gov/wakefield for more information!

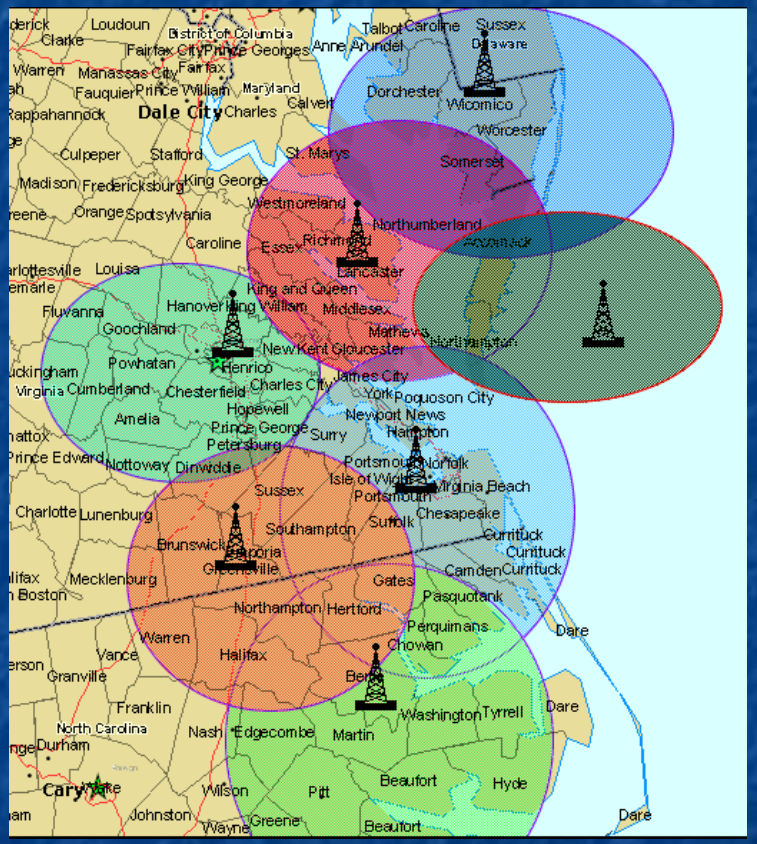
Staying informed: Text Products of Note

Area Forecast Discussion

- Issued at least 4 times a day
- Discussion of forecast
  - Near term
  - Short term
  - Long term
  - Marine
  - Aviation
  - Climate, Fire Weather, Equipment

NOAA Weather Radio

- Nationwide network of radio stations
  - Broadcasts continuous weather information directly from the NWS
- Most emit a loud alarm when a warning is issued
- Radios can be set up to alarm only for your county and/or nearby counties (S.A.M.E./Public Alert)



162.400 MHz	162.425 MHz	162.450 MHz	162.475 MHz	162.500 MHz	162.525 MHz	162.550 MHz

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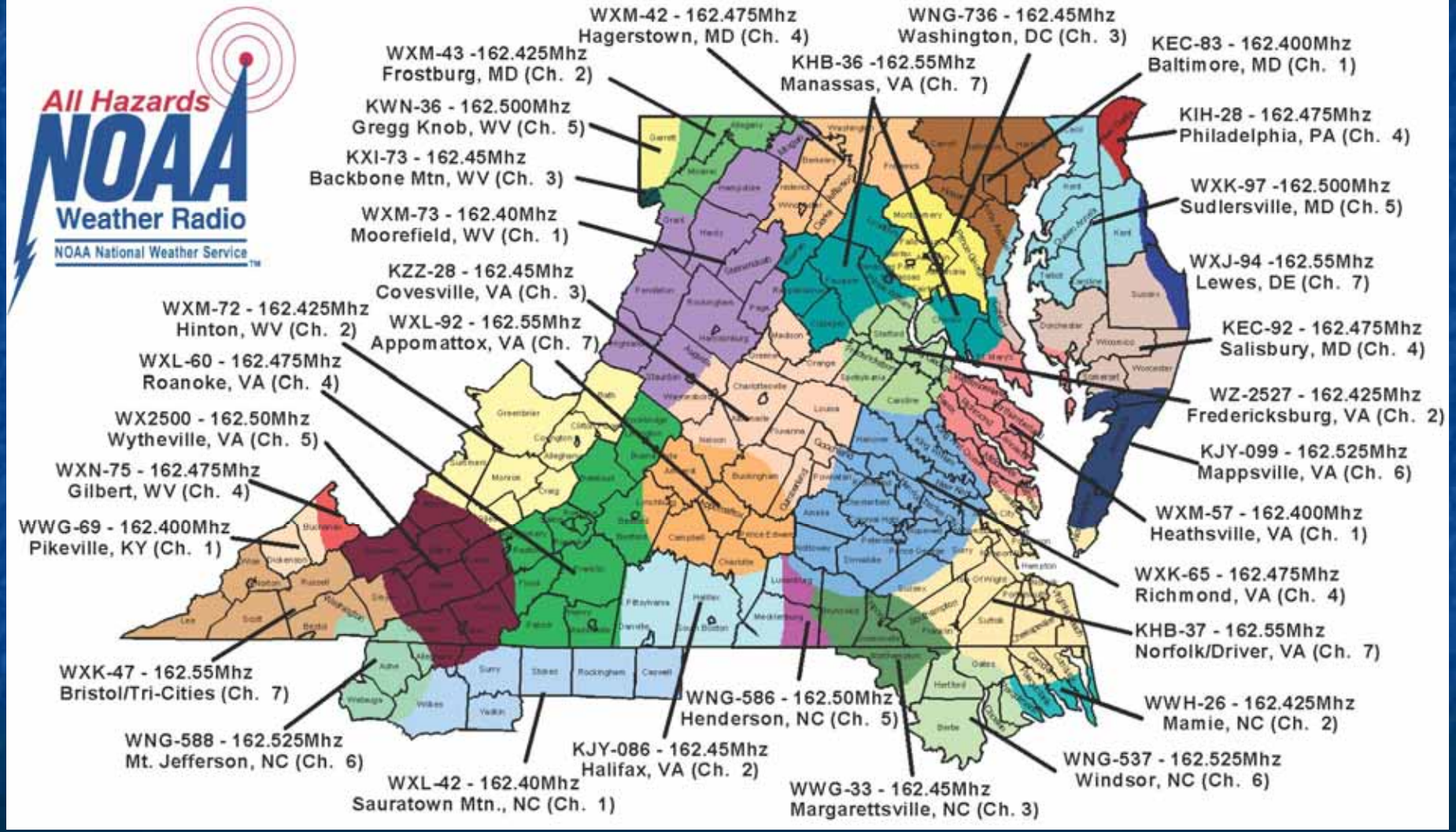
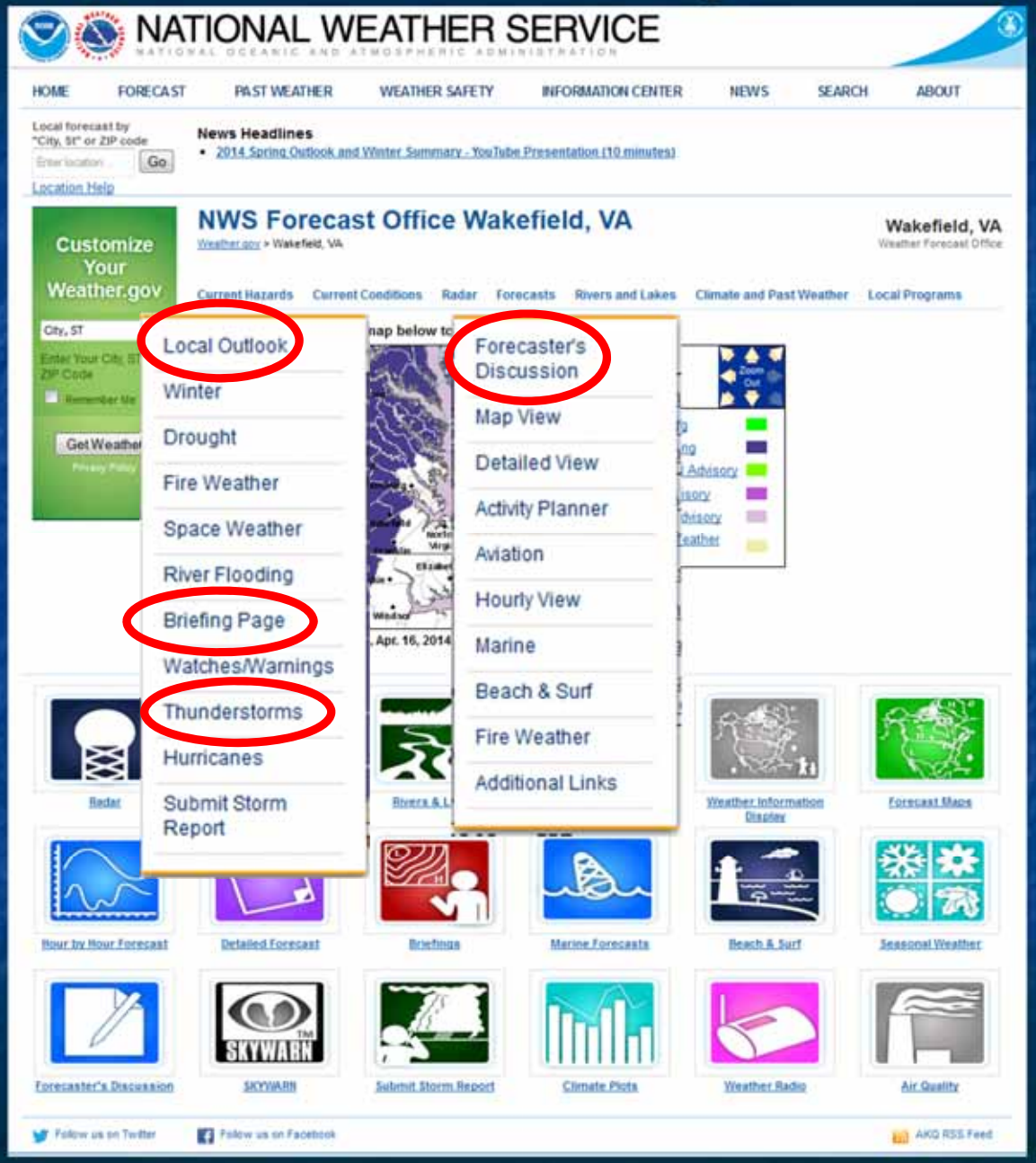
Radio Coverage Areas

Mid-Atlantic NOAA Weather Radio



http://www.erh.noaa.gov/er/akq/docs/MidAtlanticNWRandFIPS.pdf

Our Website weather.gov/wakefield



Severe Thunderstorm Briefing Page

Weather.gov > Wakefield, VA > Severe Thunderstorm Briefing Page

Wakefield, VA
Weather Forecast Office

Main EM/Briefing Page	Severe Thunderstorms	Tides/Coastal Flooding	Rivers/River Flooding	Extended Forecasts & Drought	Space Weather	Fire Weather
Rain and Snow Forecasts	Hurricanes	Marine Weather	Radar and Satellite	Climate Data	Maps and Models	Safety and Preparedness

Hazardous Weather Outlook (HWO)	WFO Wakefield Local Storm Reports	National GIS Based Storm Reports	Severe Mesoanalysis Page	Past Storm Events Web Page

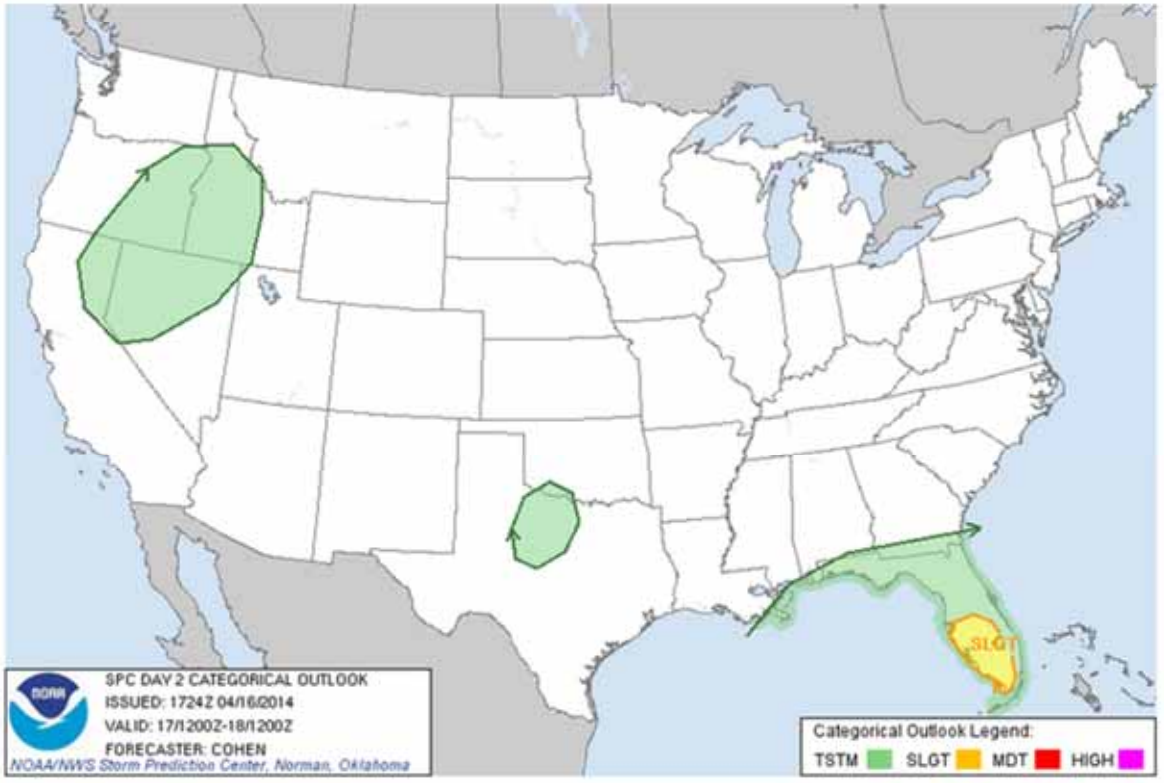
Storm Prediction Center (SPC) Products

Day 1 Outlook	Day 1 Tor Probability
Day 1 Wind Probability	Day 1 Hail Probability
16Z-20Z Tstm Outlook	20Z-00Z Tstm Outlook
00Z-04Z Tstm Outlook	04Z-12Z Tstm Outlook
Day 2 Outlook	Day 2 SVR Probabilities
Day 3 Outlook	Day 3 SVR Probabilities
Day 4 to 8 SVR Outlook	Current Meso Discussions
Valid SVR/TOR Watches	SPC Mesoanalysis Page

SPC Storm Reports and Mid Atlantic Weather Balloon Plots

Today's Storm Reports	Storm Reports Last 3 Hours
Storm Reports Yesterday	Wallops Island Sounding
Dulles Sounding	Greensboro Sounding
Blacksburg Sounding	Morehead City Sounding

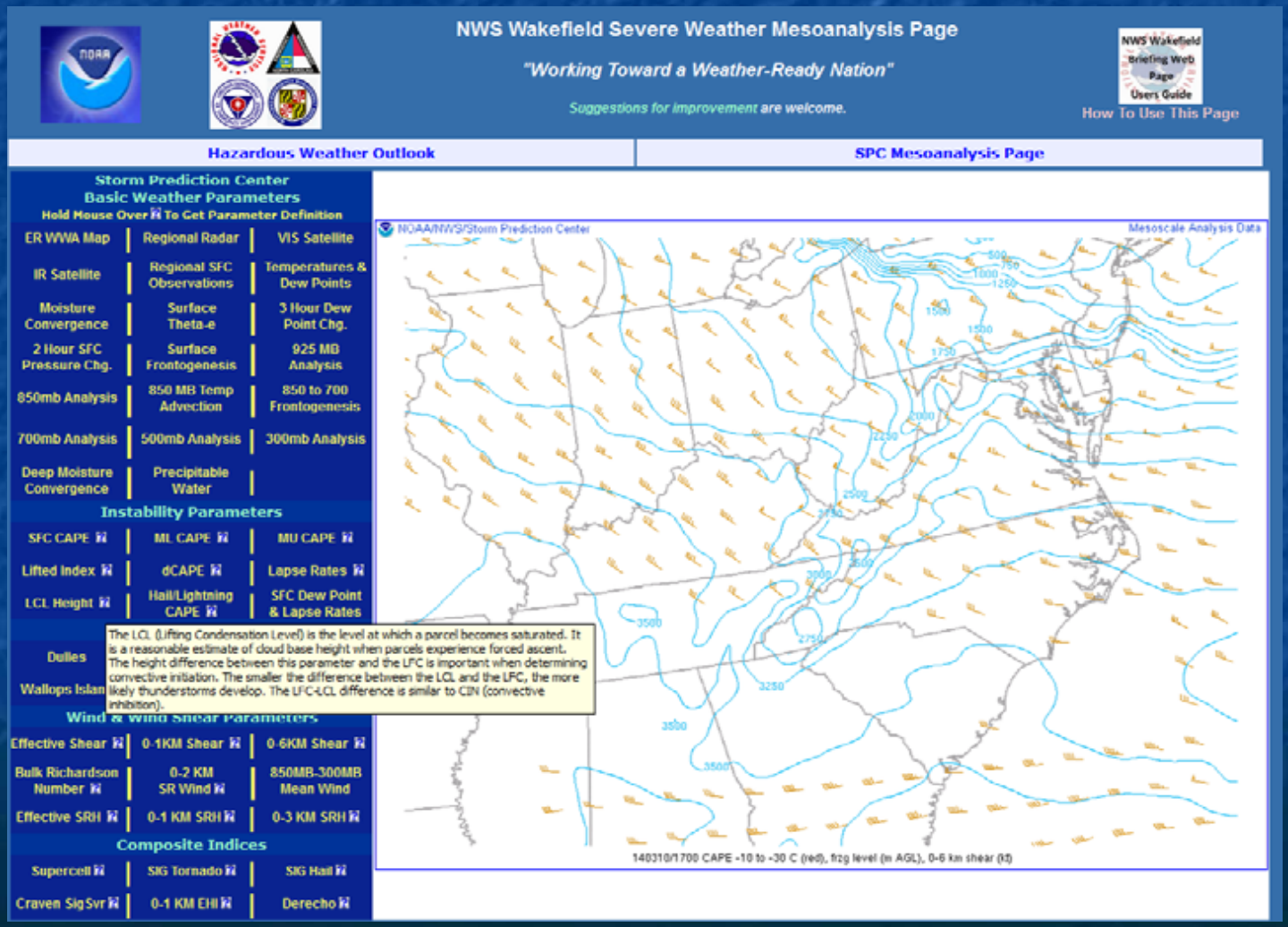
Severe Mesoanalysis Page



http://weather.gov/akq/SevereThunderstorms

Staying informed:
Website Briefing Information

http://www.erh.noaa.gov/akq/brief/severebrief.php
Or using new website…Current Hazards/Briefing Page



Giving an Effective Spotter Report...

Best

National Weather Service

National Weather Service weather.gov/Wakefield

The Effective Spotter Report

- **WHO? - Source of report (your identity, i.e. trained spotter)**
- **WHERE? - Give your exact location (and location relative to the event)**
- **WHEN? - State the start & end time of the event (*EVENT* time vs. *REPORT* time)**
- **WHAT? – Event description (be as specific and detailed as possible)**
  - **UPDATE ongoing events – Especially Tornadoes**

The Effective Spotter Report

We want to hear from you!

NEVER assume NWS knows that severe weather has occurred. (DO NOT wait for us to call you!)

ASSUME your report is important!

DO NOT exaggerate your report!

National Weather Service weather.gov/Wakefield

Where does your report go?

- **Media!**
- Local Storm Reports
- Storm Prediction Center
- National Climate Data Center
- Research
- Warning Verification (Congressional Mandate)

What to report…

Severe Weather is:

- Tornado
- Large Hail
  - 1” or greater
- Damaging winds
  - 6”+ diameter tree limbs broken/trees down
  - implies wind of 55 mph or greater
- Flooding

National Weather Service **weather.gov/Wakefield**

Damaging Winds

Information We Need

- Location
- Extent of Damage
  - Structural damage?
  - Tree Damage?
- Duration and Time

No Damage

- Shelf or Roll Cloud
- Very gusty winds
- Tree branches broken

Tree Damage

- How Many?
- Type?
- Dead or Alive?
- Snapped off?
- Uprooted?

Tornado…Remember Safety First

Information We Need…

- Location, Path
- Time and Duration
- Damage
- Injuries?

No Tornado

- Wall Cloud or Funnel Cloud
  - Direction you are looking
  - How far down is it to the ground?
  - Rotation?

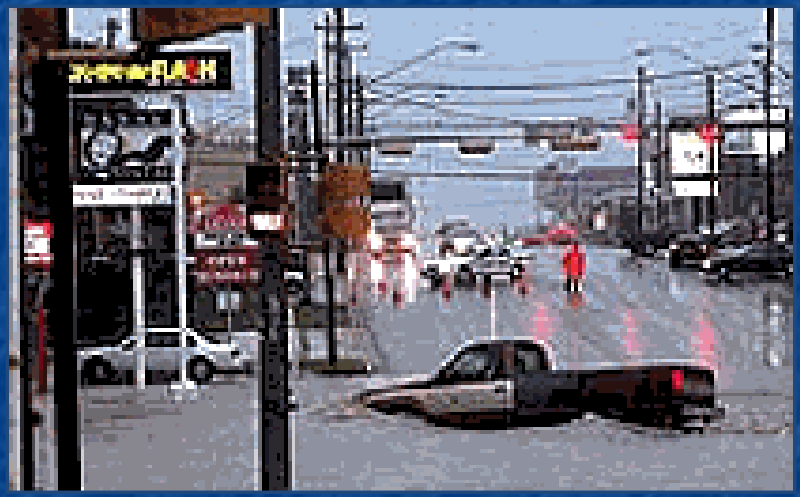
Hail

Information We Need

- Size of Largest Stone
- How Much?
- Time and Duration?
- Any Damage?

Flooding

Information We Need



- Specific Location
- Time of Flooding
- Are people in danger?
- Property flooded or threatened?
- How fast is water rising?

No Flooding

- Rising Water
- Ditches/Streams are full
- Urban Flooding

Estimating Wind Speed

25-31 mph - large branches in motion
32-38 mph – whole trees in motion
39-54 mph – twigs break off, wind impedes walking
55-72 mph – damage to chimneys and TV antennas, large branches broken and some trees uprooted
73-112 mph – removes shingles, windows broken, trailer houses overturned, trees uprooted
113+ mph – roofs torn off, weak buildings and trailer houses destroyed, large trees uprooted

When in doubt about your estimate, re-think it based upon any damage that has occurred.

What To Report

Snowfall or Ice Amounts

National Weather Service weather.gov/Wakefield

Reporting Information to the NWS

- **Directly to the NWS**
  - **757-899-2415** **Severe Weather Reports only!**
  - **757-899-4200 for Forecast info**
- **E-Mail**
  - Akq-report@noaa.gov
  - Send reports through pictures (or video)
- **Social Media –**
  - **FB: US National Weather Service Wakefield VA**
  - **Twitter: @NWSWakefieldVA**

- **Amateur Radio : http://www.wx4akq.org/**

Break Time!! – 10 minutes please

Hang in There…

Basic SKYWARN Part 2

Part 2 Overview

- Basic Thunderstorm Structure
  - Necessary ingredients
  - The Lifecycle of a thunderstorm
  - Shelf Clouds and Wall Clouds
- Thunderstorm Climatology
- You Make the Call!
- Winter Weather Basics
- Reporting to the NWS
- Question & Answer (Complete Spotter form)

The Thunderstorm

Ingredients necessary

- 1. ***MOISTURE***
  - Preferably in the lower or middle levels of the atmosphere (dewpoints, or relative humidity)
- 2. ***INSTABILITY***
  - Ability for air to accelerate upward/downward when started up/down
- 3. ***SOURCE OF LIFT***
  - **Agent which lifts moist unstable air, starting the thunderstorm**

Storm Formation
"Instability"

Courtesy John Vale

Unstable

Courtesy Mike Hollingshead

Stable

Sources of Lift

Any front or boundary

(cold fronts, warm fronts, stationary fronts, gust fronts, wind convergence lines, Sea Breeze Boundary)

Jet streams

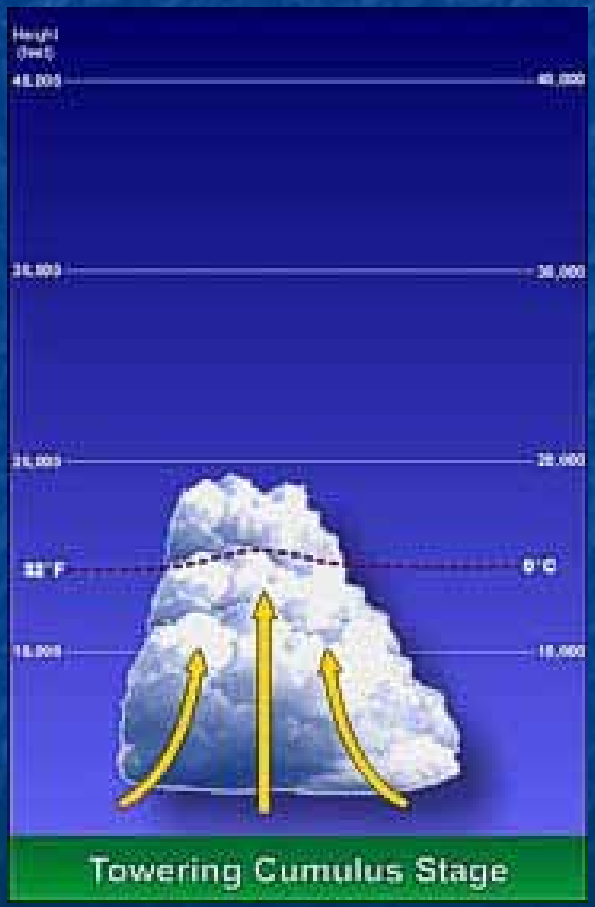
Mid to Upper atmospheric troughs

Now…on to the Thunderstorm Life Cycle!

Thunderstorm Life Cycle

- Developing/Towering Cumulus Stage
  - Slight risk of severe weather
- Mature Stage
  - Greatest threat for severe weather
- Dissipating Stage
  - Slight risk of severe weather

Towering Cumulus Stage



The developing storm consists entirely of updraft.

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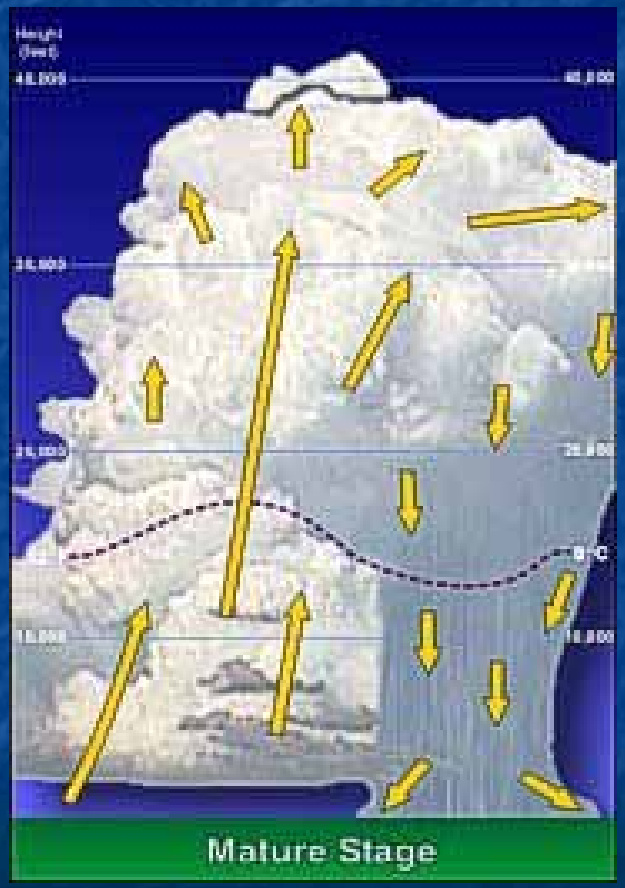
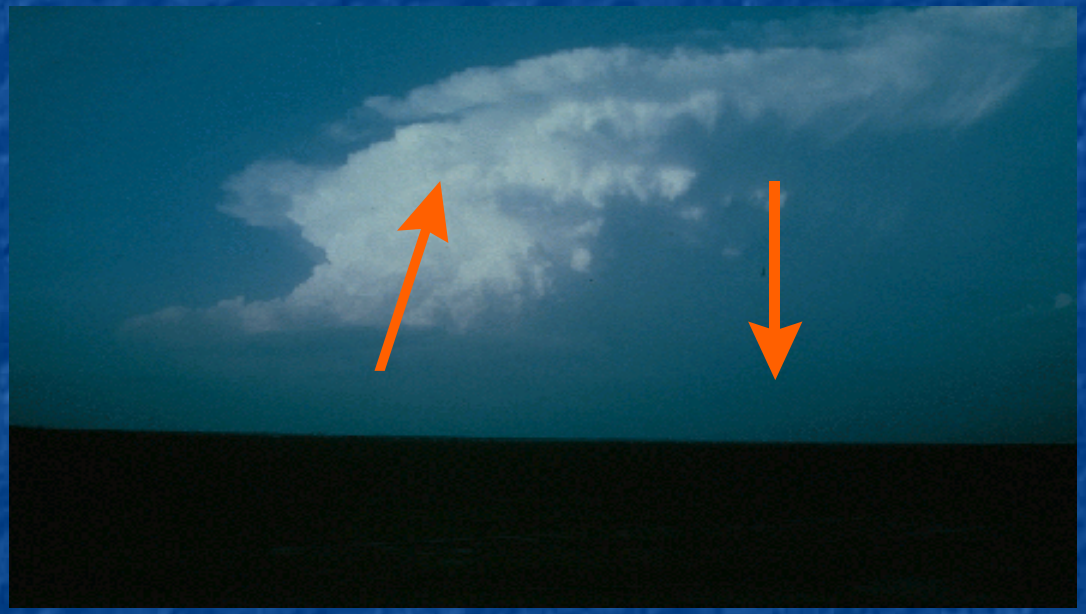
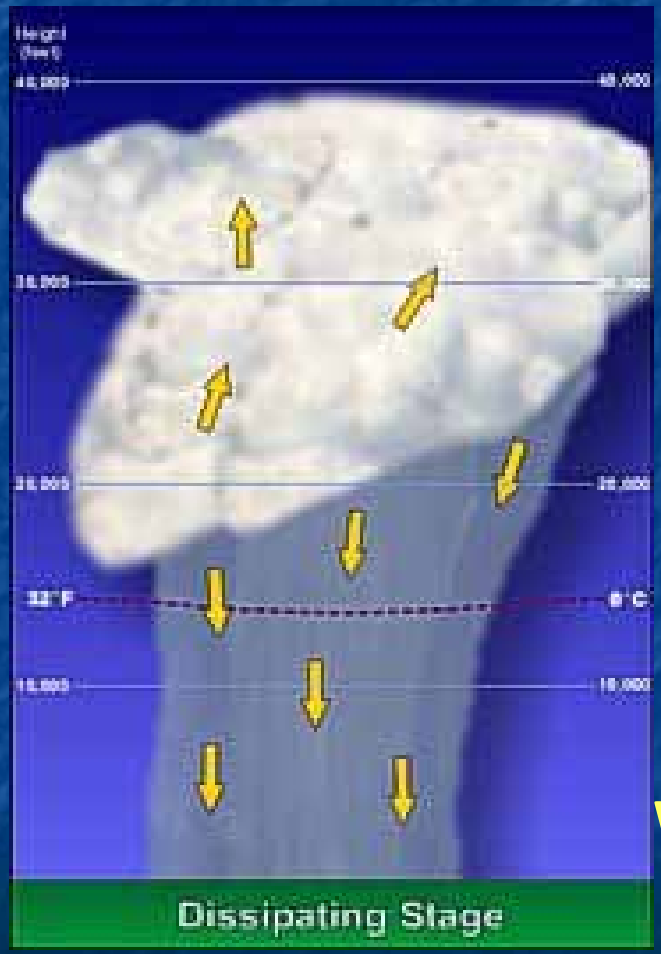
Mature Stage

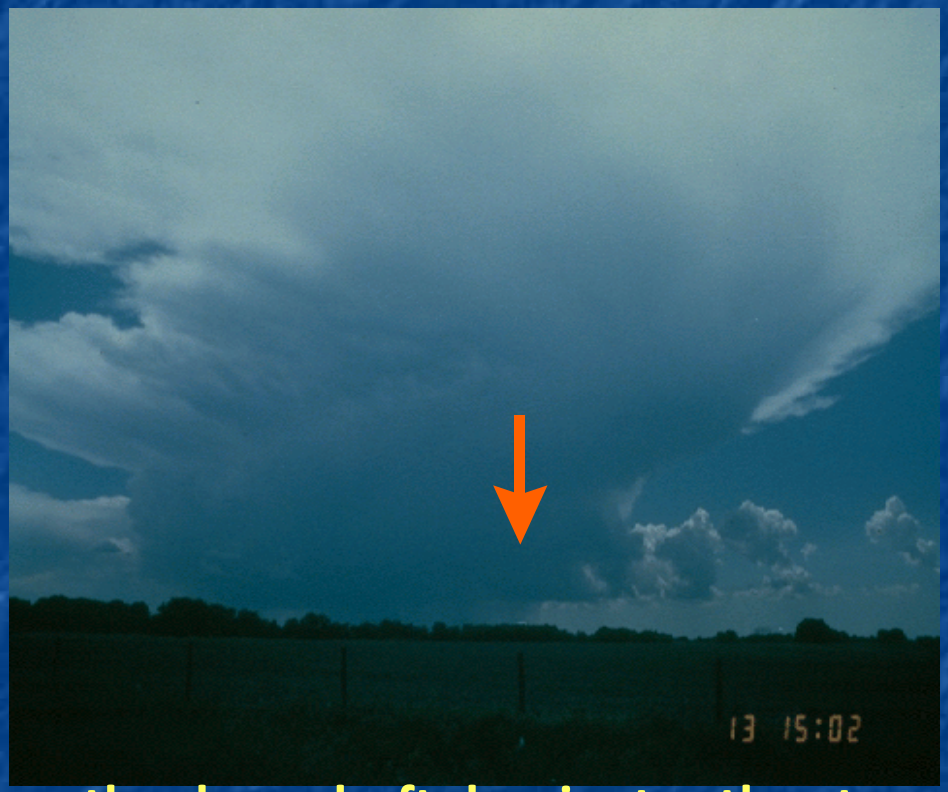




When the downdraft develops, the storm has entered into the mature stage.

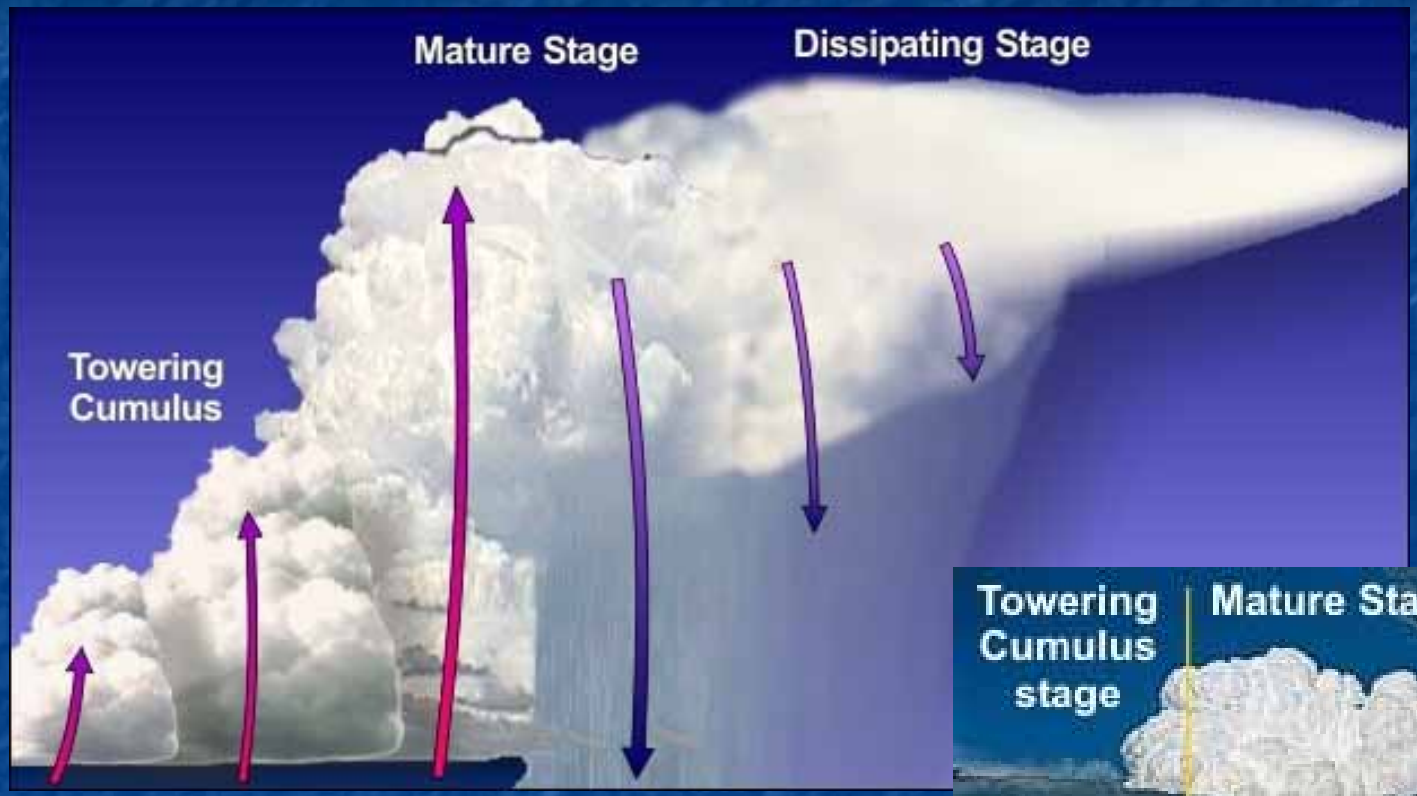
Dissipating Stage

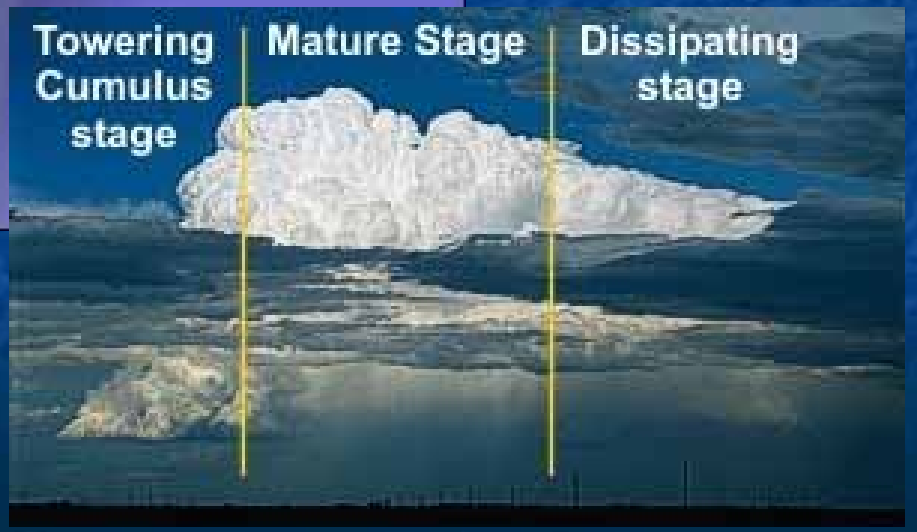




When the downdraft dominates the storm, it has entered into the dissipating stage

Multi Cell

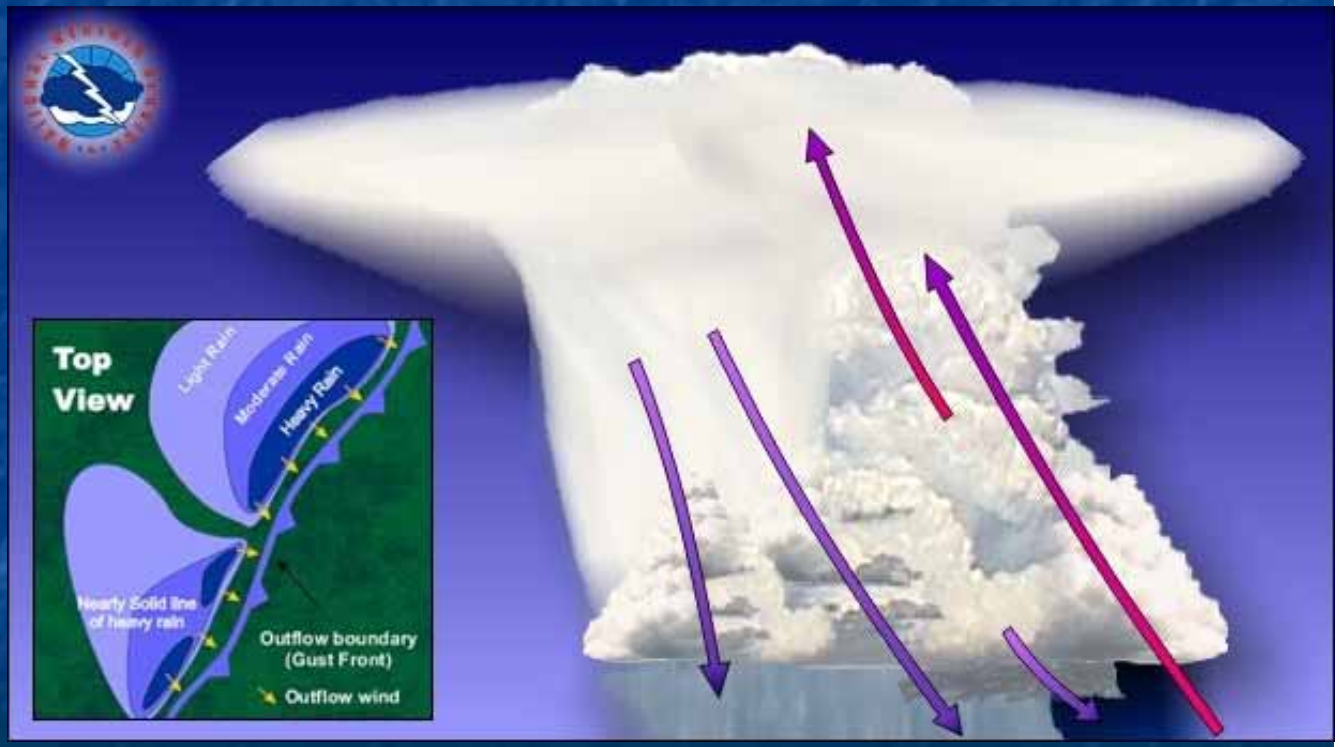




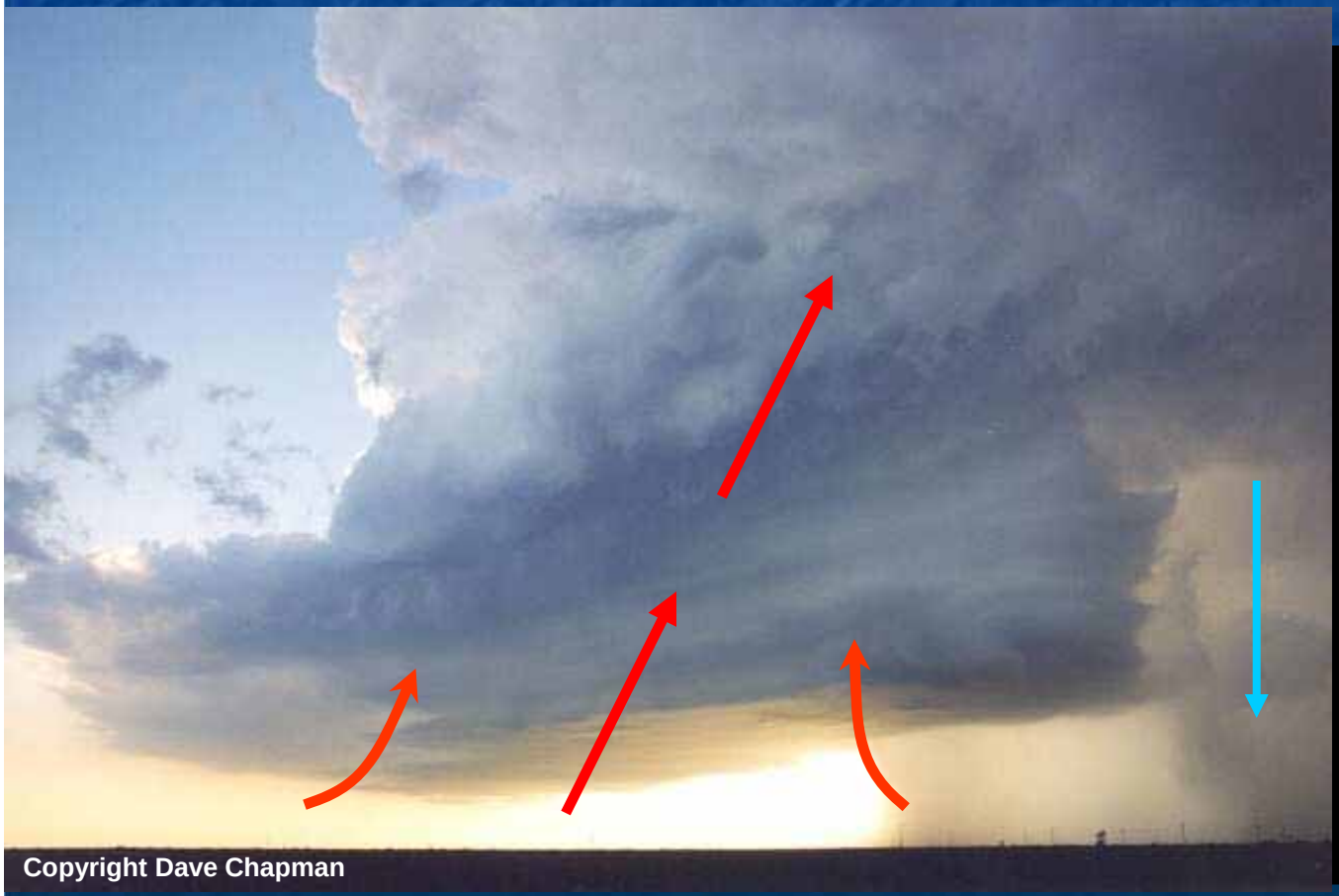
National Weather Service weather.gov/Wakefield

SQUALL LINE

- Can extend for hundreds of miles
- These "squall lines" can persist for many hours ("Derecho")
- Main threats are damaging winds and hail



Updraft Characteristics



-"Back" side of storm
-Cumulus tower
-Rain-free base
-Upward cloud motion (Rising air)
-Supercell has rotating updraft
- Stronger updraft means stronger storm

Downdraft Characteristics

-"Front" side of storm
-Dark area of storm
-Rainfall region
-Downward motion
-Downburst/hail threat

Downburst Evolution

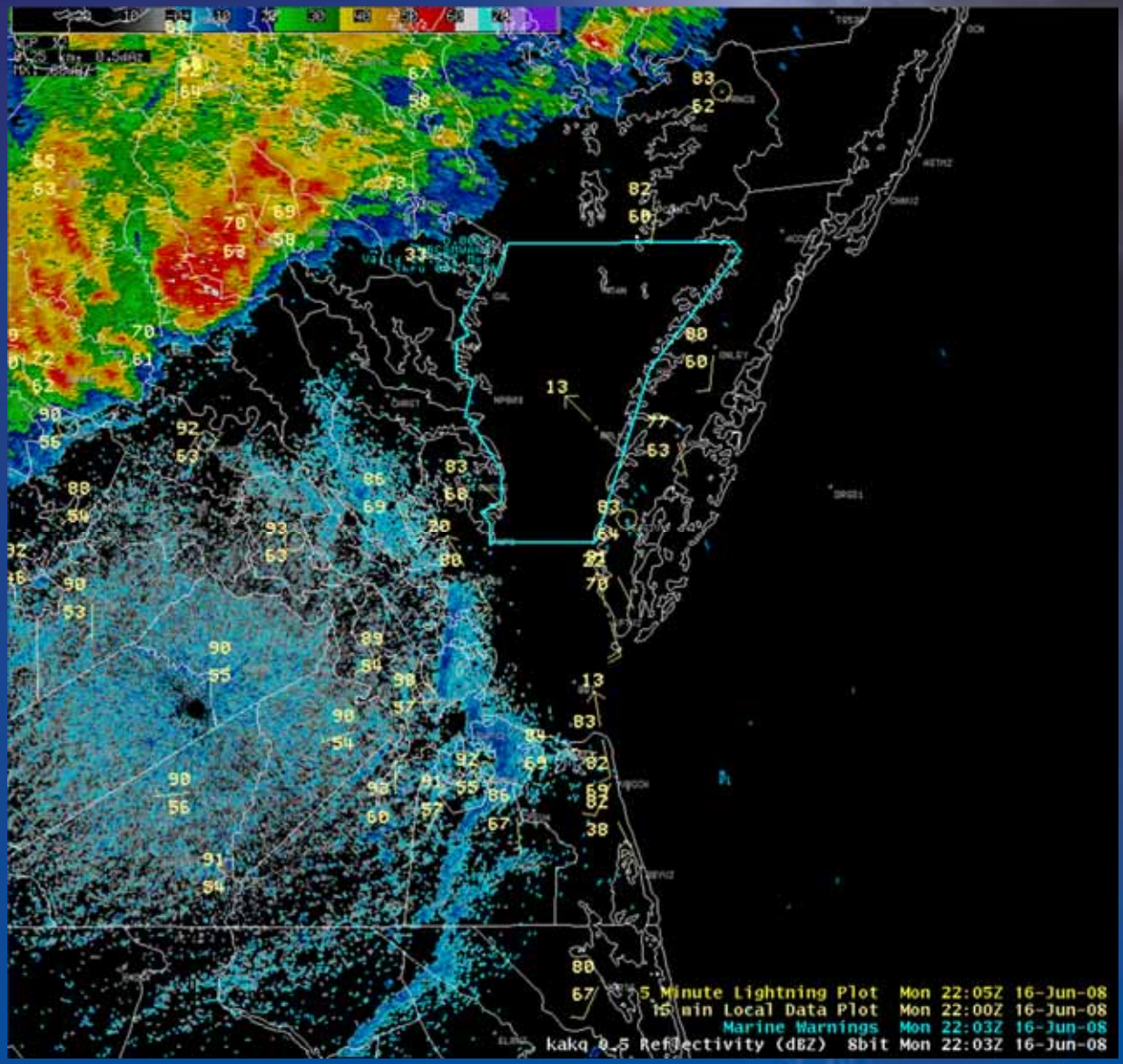
FORMATION - Evaporation and precip. drag forms downdraft

IMPACT - Downdraft quickly accelerates and strikes ground

DISSIPATION - Downburst moves away from point of impact

Outflow Boundaries

Outflow Boundary Interacts with Sea Breeze Boundary Over SE VA



Straight - line winds

Straight-line wind damage typically associated with bow echoes.

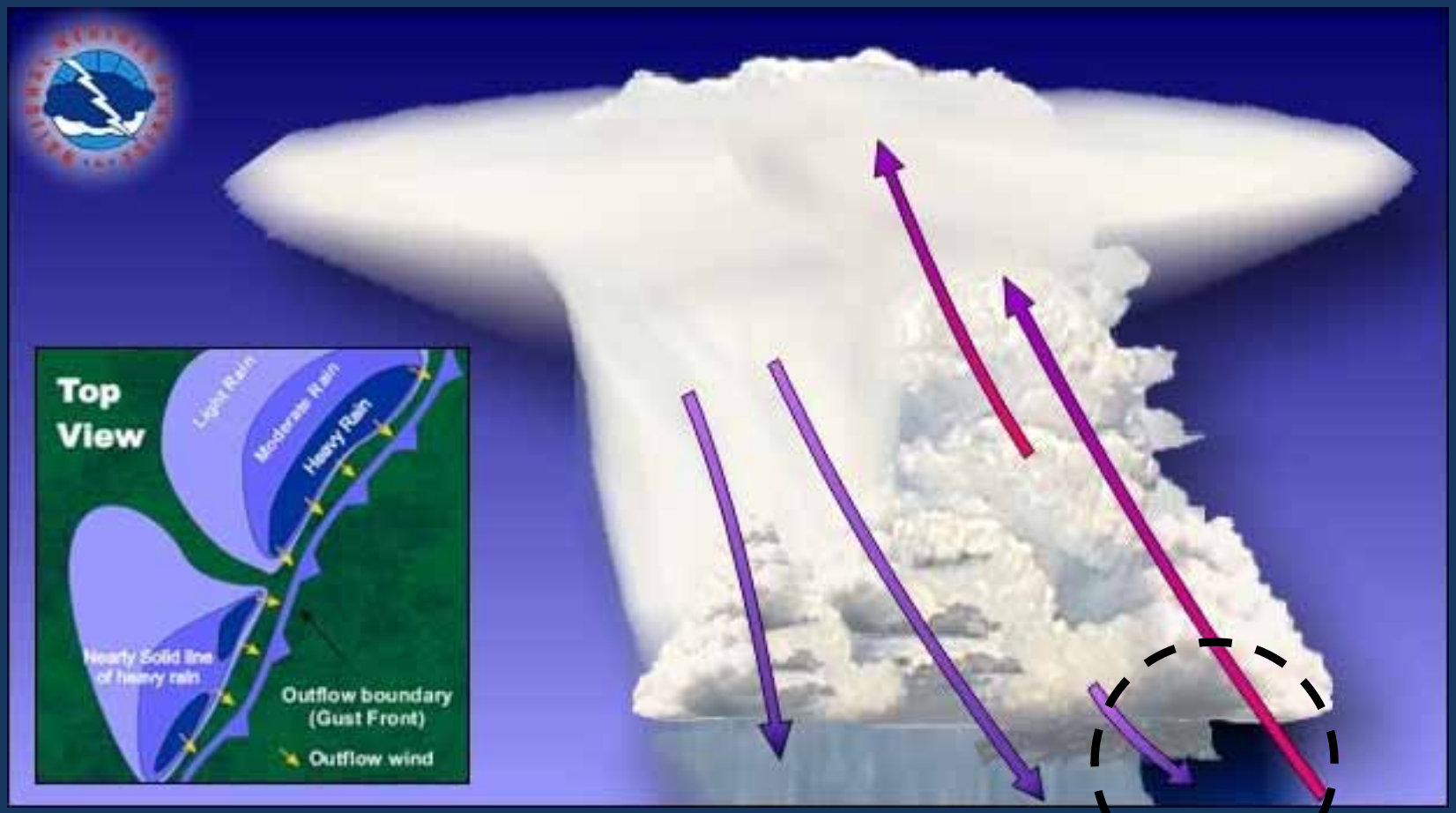
Note trees are laying in the same general direction.

Downburst Damage

Microbursts

- Damaging straight line winds from a single thunderstorm
- Can cause damage equivalent to that of an EF0-EF1 tornado (more on EF-Scale shortly).
- Winds can exceed 80-90 MPH

Squall Line Schematic



Key to squall line identification and positioning is the shelf cloud

Shelf Cloud

- Also known as “Roll Cloud”” (Horizontal rotation)

- A long Cigar-Shaped Cloud, on the leading edge of a T-storm

- Be Alert to Strong winds (up to hurricane strength!)

- Wind First, then Rain

Straight-line Winds (Shelf Cloud)

Leading edge of gust front is found underneath the shelf cloud. Think "OUTFLOW!"

National Weather Service **weather.gov/Wakefield**

Cloud Identification

Wall Cloud

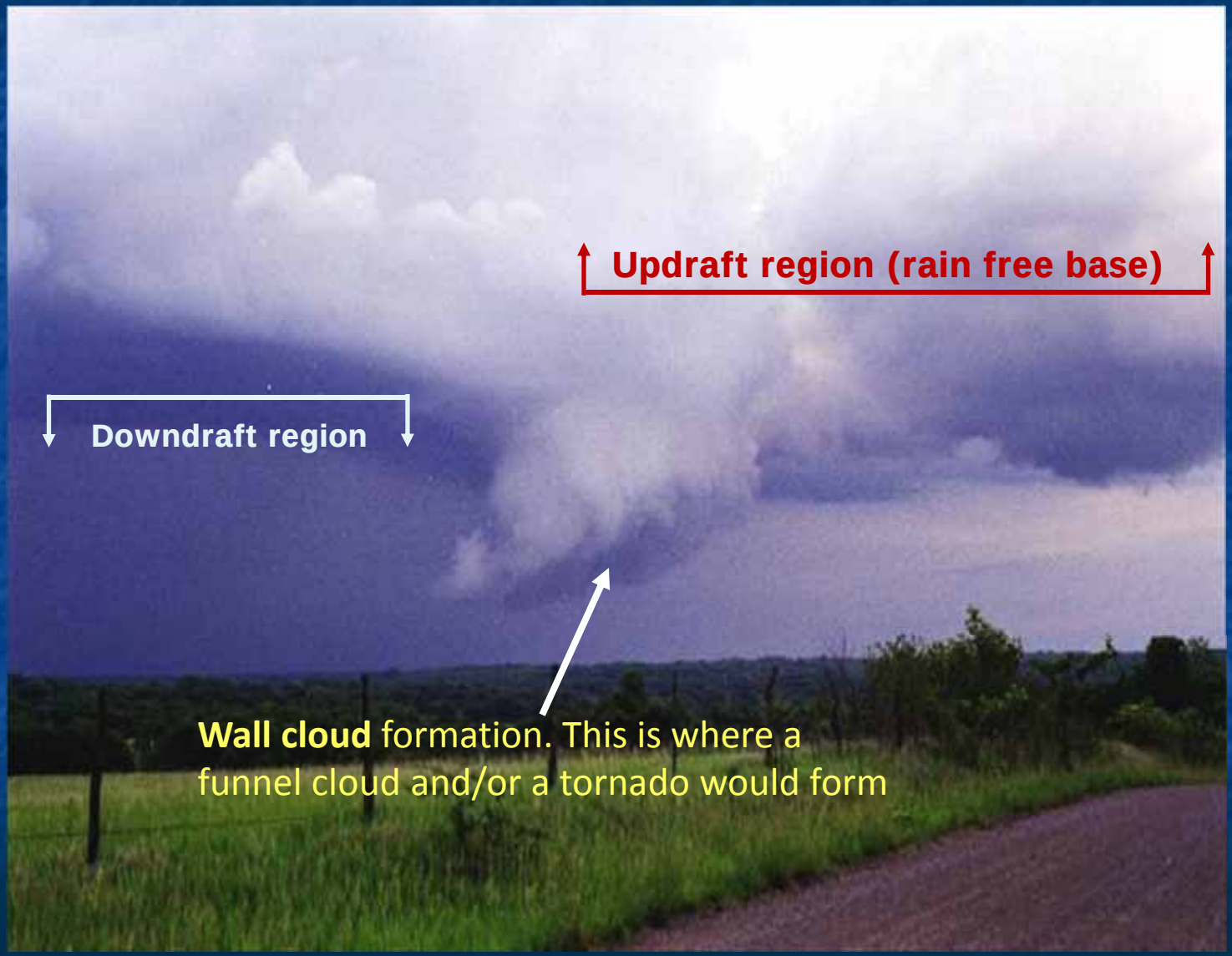
Located under the updraft

Wall Cloud

- Visible rotation
- Can be a precursor to a tornado
- Lowering clouds ***attached*** to the rain-free base
- On the back side of the storm, and may rotate.

Most storms do not have wall clouds!

Wall Cloud


Updraft region (rain free base)
Downdraft region
Wall cloud formation. This is where a funnel cloud and/or a tornado would form

Wall Cloud

Video Courtesy of Skip Talbot

Wall Cloud

Video near Elizabeth City, NC

Scud Clouds

- A type of low, detached, irregular cloud found beneath cumulonimbus clouds.
- Often ragged or wispy in appearance with no rotation
- Often are mistaken for a funnel cloud or developing tornado.
- Determine if there's any rotation (not just movement)

Severe Storm Review: Two Faces

Shelf Cloud

- Front of Storm
- Outflow/Downdraft
- Long Large Cloud
- Downburst Wind

Wall Clouds

- Rear of storm
- Inflow/Updraft
- Possible Tornado
- Near Hail Region
- Not always present pre-tornado
- Report Immediately!

- The UPDRAFT is hard and bubbly or cauliflower-like in appearance.

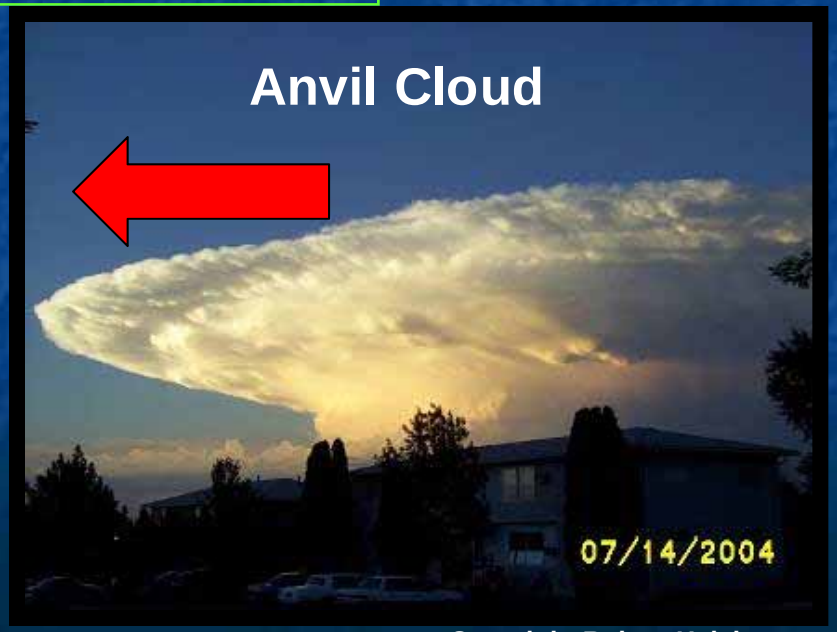
Copyright Mark Erk

Mid Level Storm Strength Clues

Copyright R. Hay Cummins

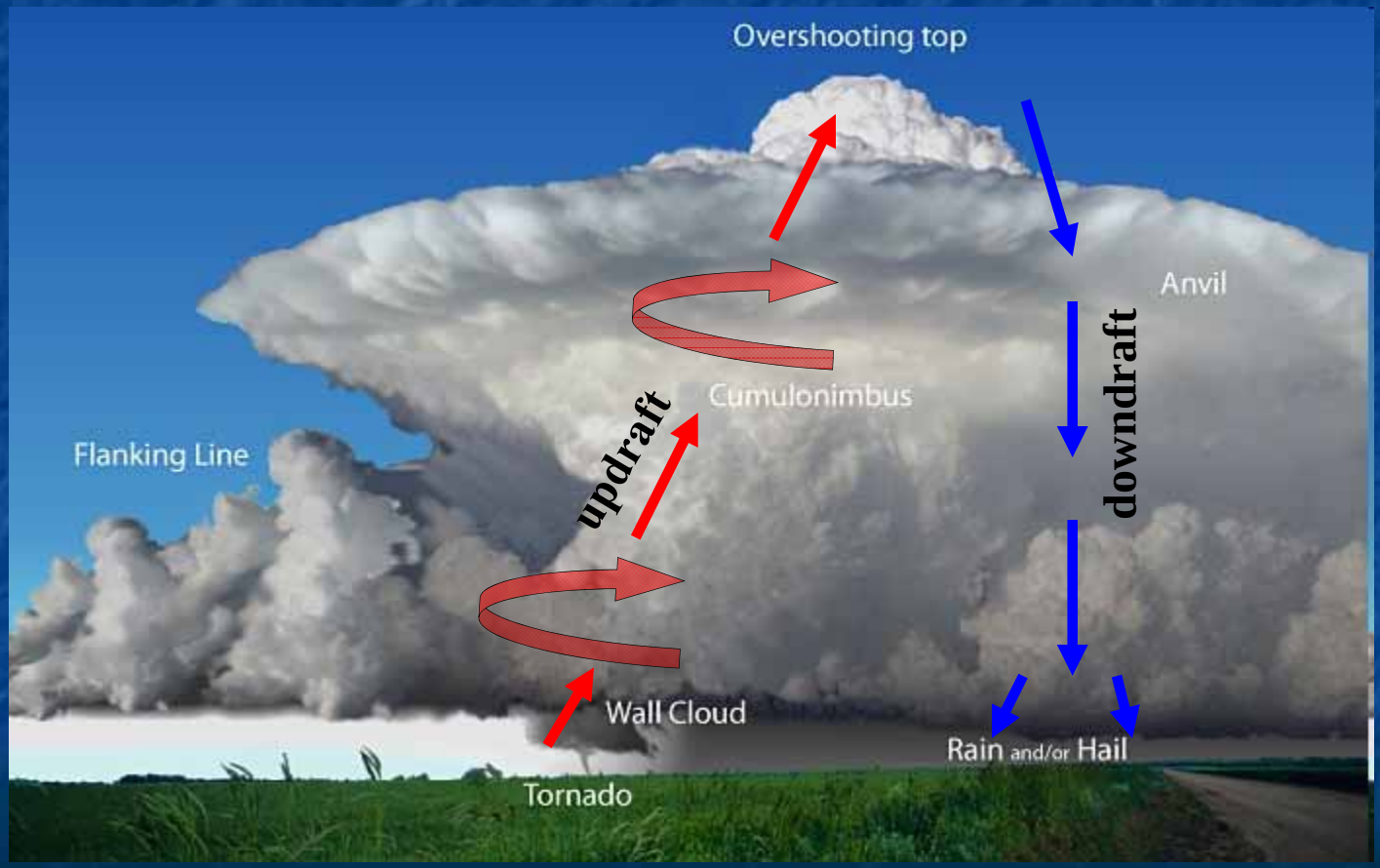
Copyright Nicole Kelly

Upper Level Storm Strength Clues



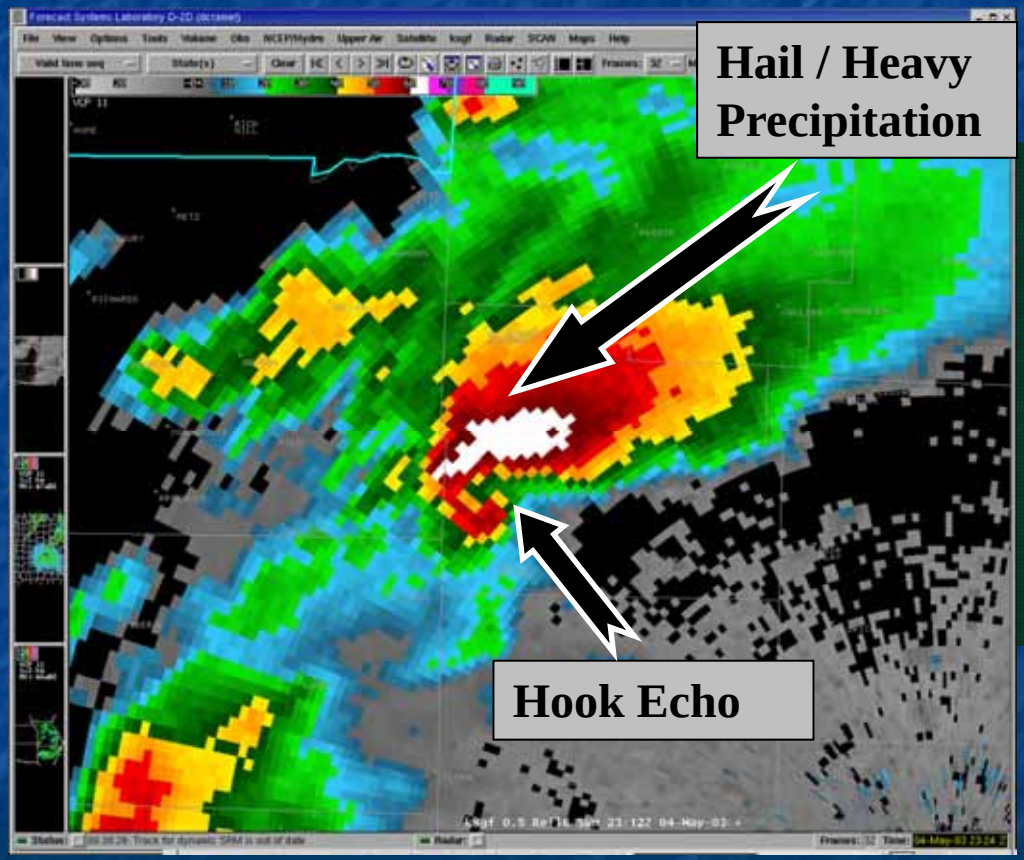
Copyright Robert Heishman

Supercell Example



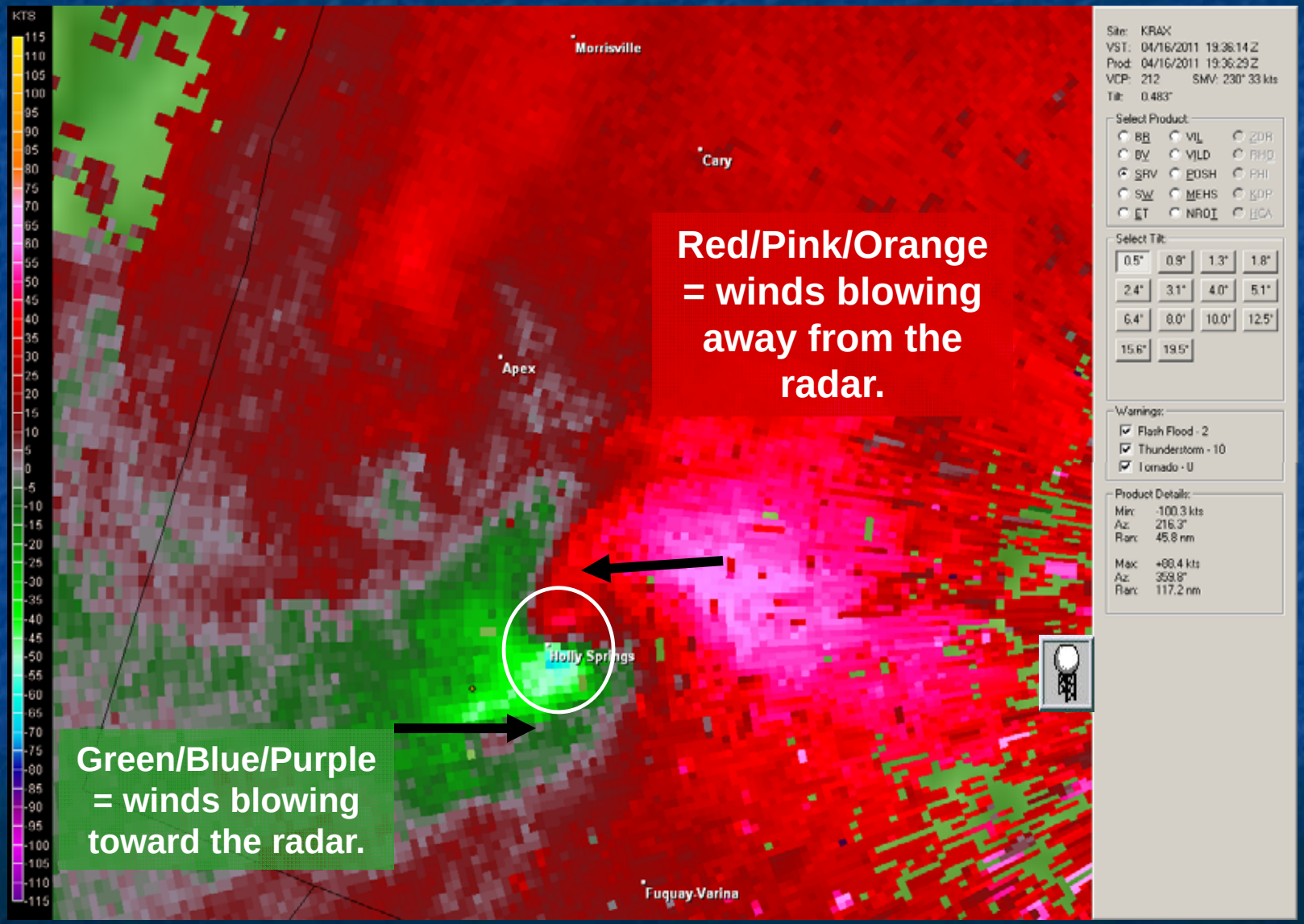
National Weather Service **weather.gov/Wakefield**

Supercell Radar Signatures



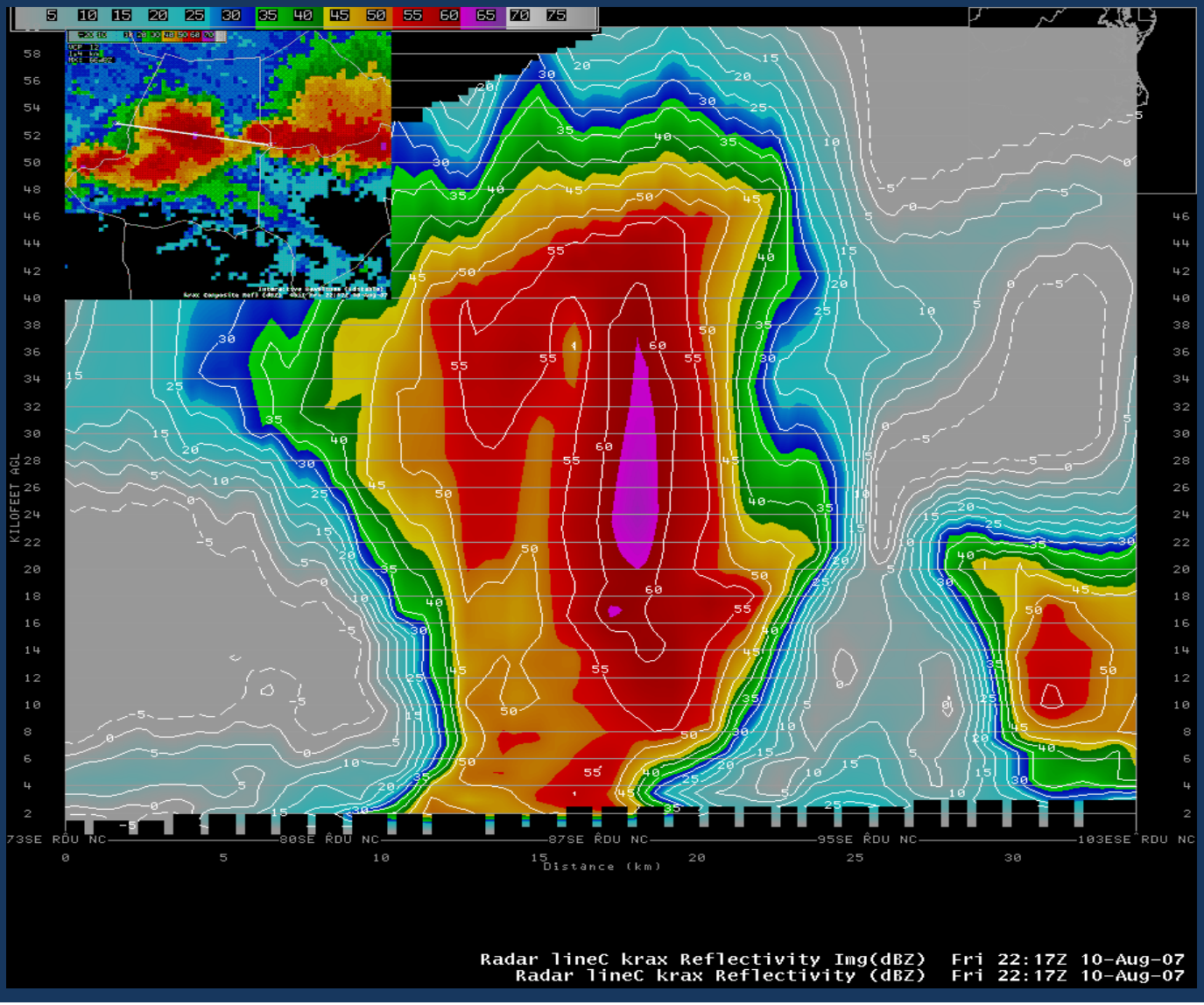
The classic "hook" shape is caused by heavy precipitation wrapping around the rotating updraft (mesocyclone).

Supercell Radar Signatures



Supercell Radar Signatures

Hail Core in a Supercell Thunderstorm



Tornado

- A rapidly rotating column of AIR in contact with the wall cloud or updraft base AND the ground

- Often proceeded by a wall cloud, then funnel cloud
- May or may not see a visible funnel right away
- Will have rotation and debris

Tornado Life Cycle

Wall Cloud

National Weather Service weather.gov/Wakefield

Tornado Life Cycle

Funnel Cloud

National Weather Service weather.gov/Wakefield

Tornado Life Cycle

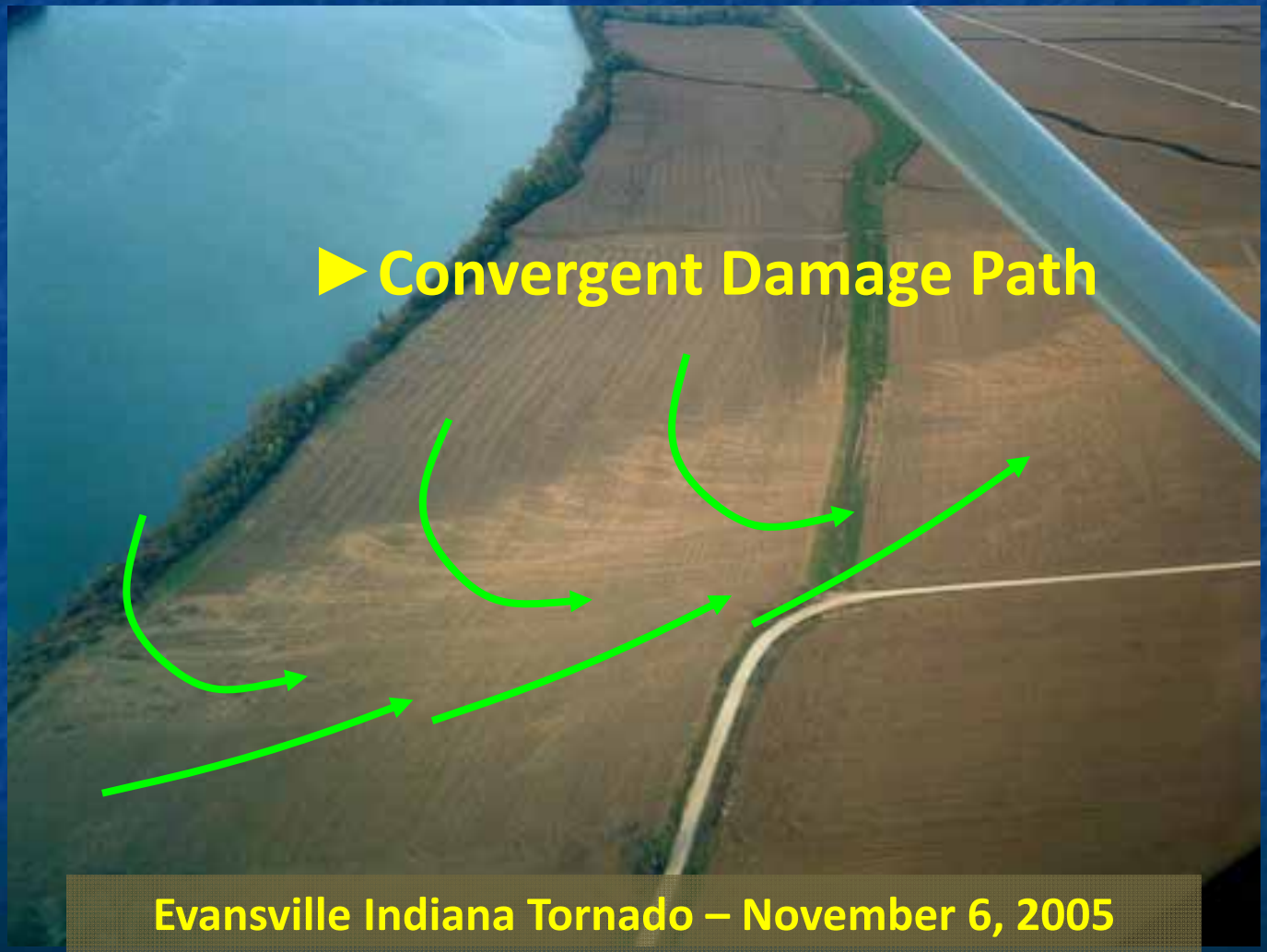
Tornado

Note: Swirling debris at ground level in both pictures below.

Condensation funnel **does not** have to "touch" ground.

Straight Line Wind vs Tornado Wind

What's the Difference?



Evansville Indiana Tornado – November 6, 2005

National Weather Service weather.gov/Wakefield

Straight Line Wind vs Tornado Wind

What's the Difference?

- **Downbursts - straight or divergent damage patterns**

(From Fujita 1985)

You Make the Call…

What would *you* report?

You Make the Call…

What would *you* report?

York County, VA June 2013

This is a great example of a strong thunderstorm… In this case a **downburst.** Winds are easily in excess of 70 MPH. (Thanks to Paul Long for the video!)

You Make the Call…

This is the leading edge of a thunderstorm. Note the shelf or roll cloud in this video.

You Make the Call…

This is a very well-defined **wall cloud** which occurred in association with a EF-0/EF-1 tornado that moved across New Kent County 10/13/2011

You Make the Call

SCUD!

Always look for rotation with clouds that are attached to the Base of the thunderstorm

Video Courtesy of Lionel Cruz


Wall Cloud? Funnel? Tornado? Nothing?
© 2010 Brad Nelson
A rain wrapped Tornado is barely visible. This is an EF4 tornado that is bearing down on Wadena MN, June 17, 2010.

You Make the Call…

Funnel Cloud or Tornado ?

Tornado !

Note flying debris below funnel

National Weather Service weather.gov/Wakefield

You Make the Call…

Funnel Cloud

…But could it also be a tornado?

Video Courtesy of Lionel Cruz

SKYWARN SPOTTERS

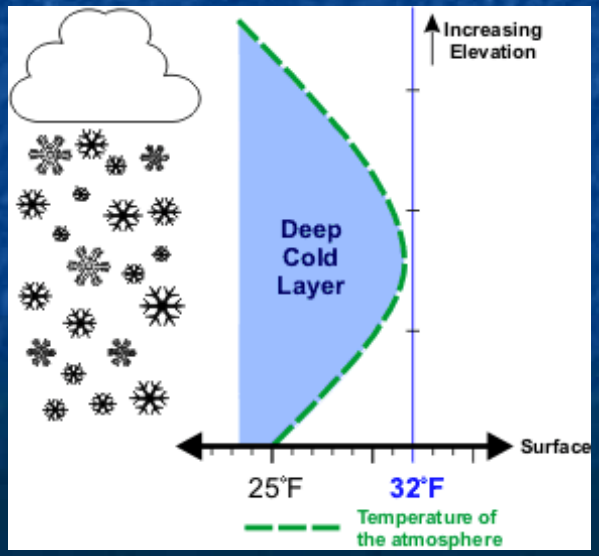
YOU ARE NOW PART OF THE TEAM!

Winter Weather Operations

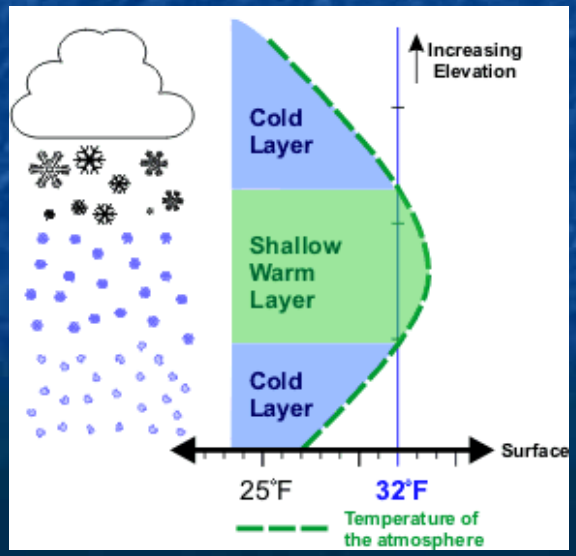
Definitions

- **Freezing Rain** – Rain falls as **liquid** and then **freezes on contact**
- **Sleet** – Rain drops freeze into ice pellets **prior** to reaching ground.
- **Snow** – An aggregation of many ice crystals

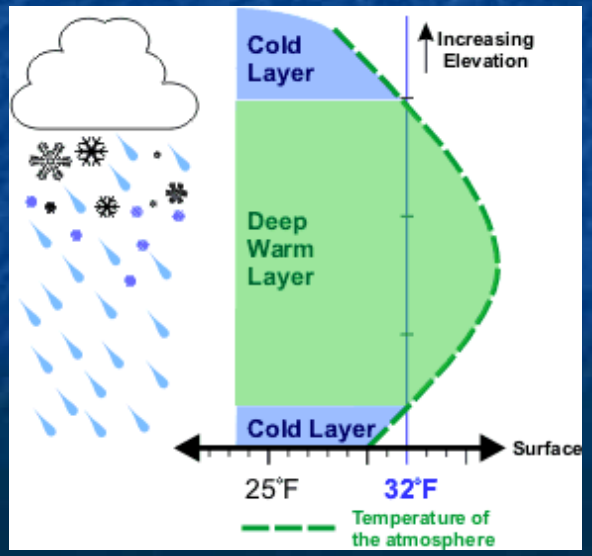
Snow Temp Profile



Sleet Temp Profile



Frz. Rain Temp Profile



Definitions (cont.)

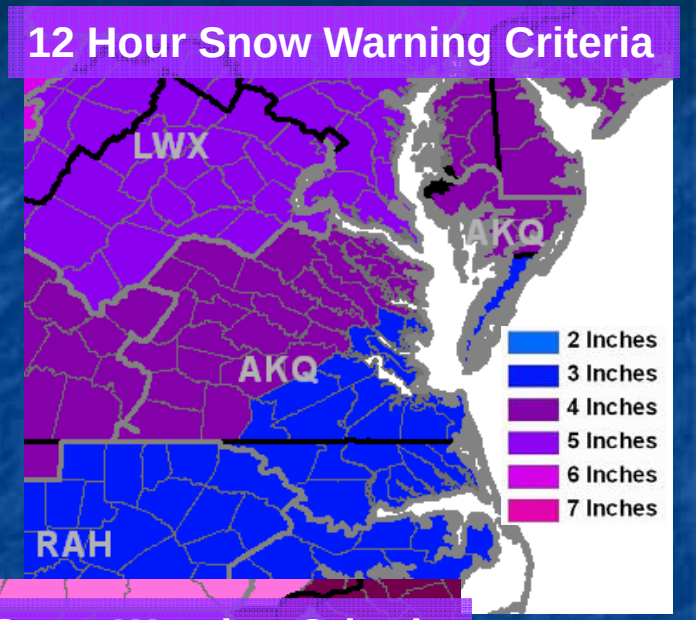
- **Graupel** – Snowflakes which have been heavily rimed. Also called snow pellets, soft hail, and hominy snow.
- **Snowfall** – Amount of new snow which has fallen. Measured to the nearest tenth of an inch.
- **Snow Depth** – Total amount of snow on the ground (old and new). Measured to the nearest inch.

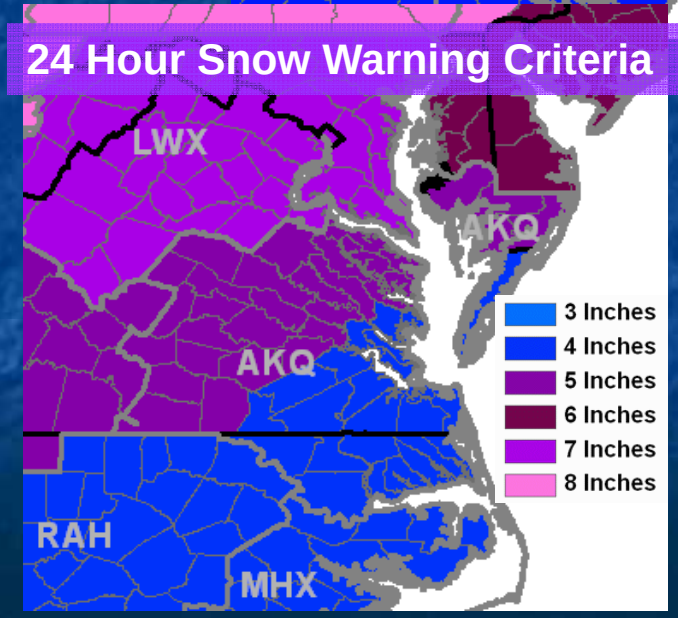
Winter Storm Product Summary

Winter Storm Product	Targeted Lead Time	If High Confidence
Outlooks	48-60+ hours	72+ hours
➢ 30% (chance) of conditions developing		
Watches	12-48 hours	48 hours
≥ 50% (good chance) of conditions developing		
Warnings	12-36 hours	> 24 hours
≥ 80% (likelihood) of conditions developing		

Winter Storm Watch

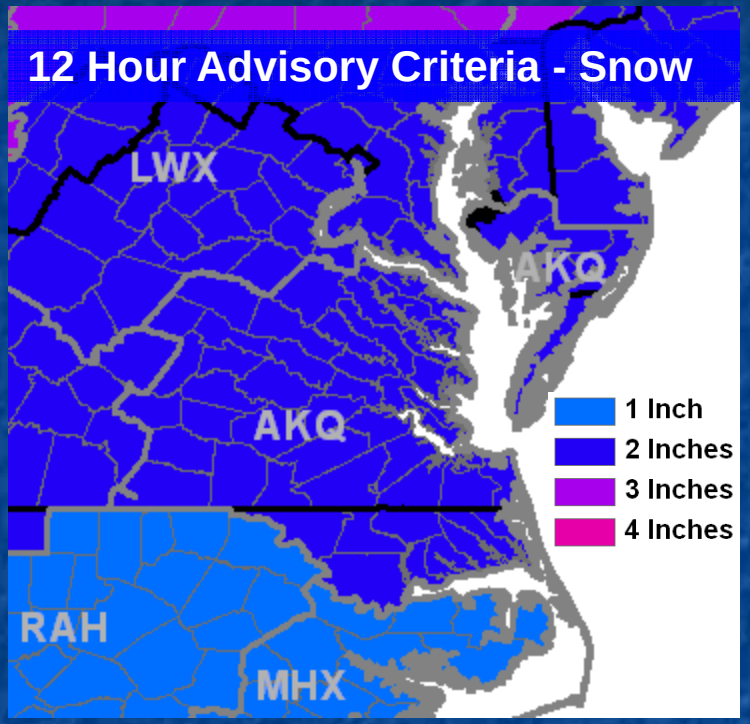
- Issued 12 to 48 hours in advance of storm
- Issued when potential exists for:
- 3-4+ inches of snow in 12 hours
- 4-5+ inches of snow in 24 hours
- Significant ice or mixed precipitation





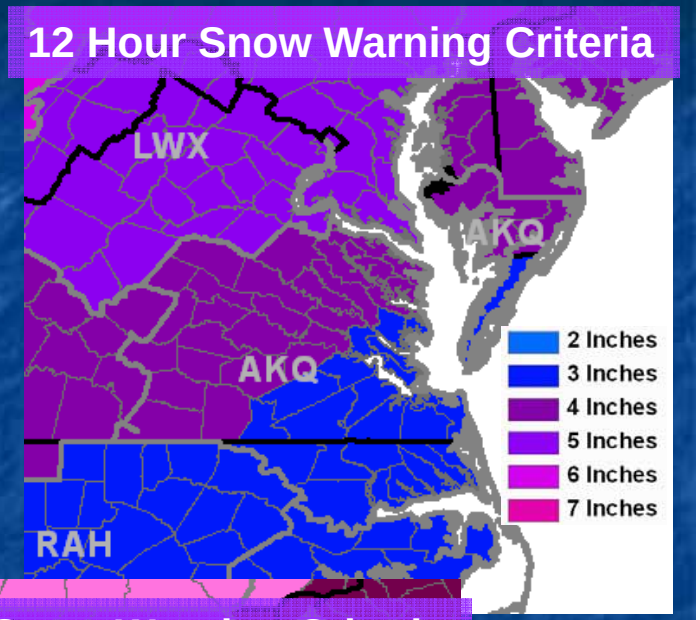
Winter Weather Advisory

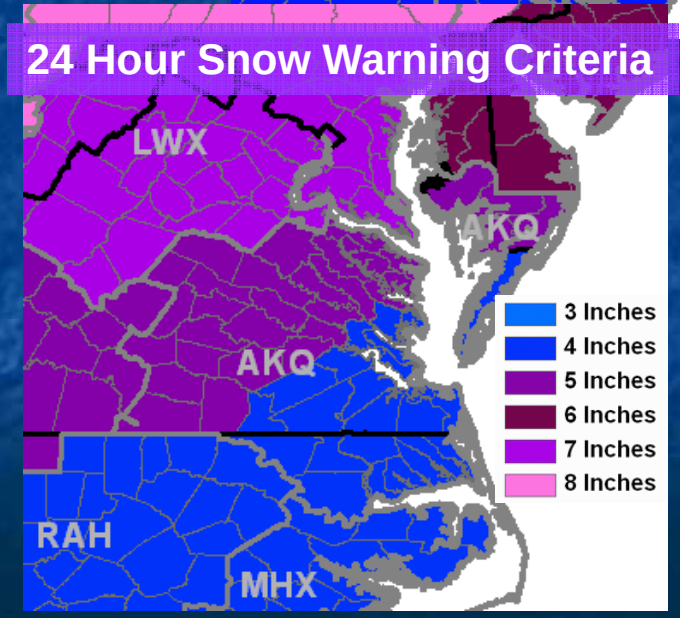
- Issued 12 to 24 hours in advance of storm
- Issued when the following are expected:
- 1 to 3 inches of snow in 12 hours
- Freezing Rain < 0.25 inches
- Minor Accumulations of Mixed Precip



Winter Storm Warning

- Issued 12 to 36 hours in advance of storm
- Issued when the following are expected:
- 3-4+ inches of snow in 12 hours
- 4-5+ inches of snow in 24 hours
- 0.25”+ Freezing Rain
- Significant mixed precipitation





Blizzard Warning

* Rare in the Mid-Atlantic region *

- Wind speeds of 35 mph or greater AND Visibility of ¼ mile or less in blowing snow

- Conditions must persist for "*at least*" 3 hours

- Blizzards may or may not be accompanied by falling snow (Ground Blizzard)

Real Time Information

What type of Information can be useful to us ?

- Heavy Snow – for example, snow falling at the rate of 1 inch per hour
- Precipitation type change – snow to rain, rain to snow, freezing rain, etc.
- Is the precipitation causing problems on roads?
- Significant Blowing and Drifting Snow – Is drifting making travel difficult (or impossible)?

Special Cases

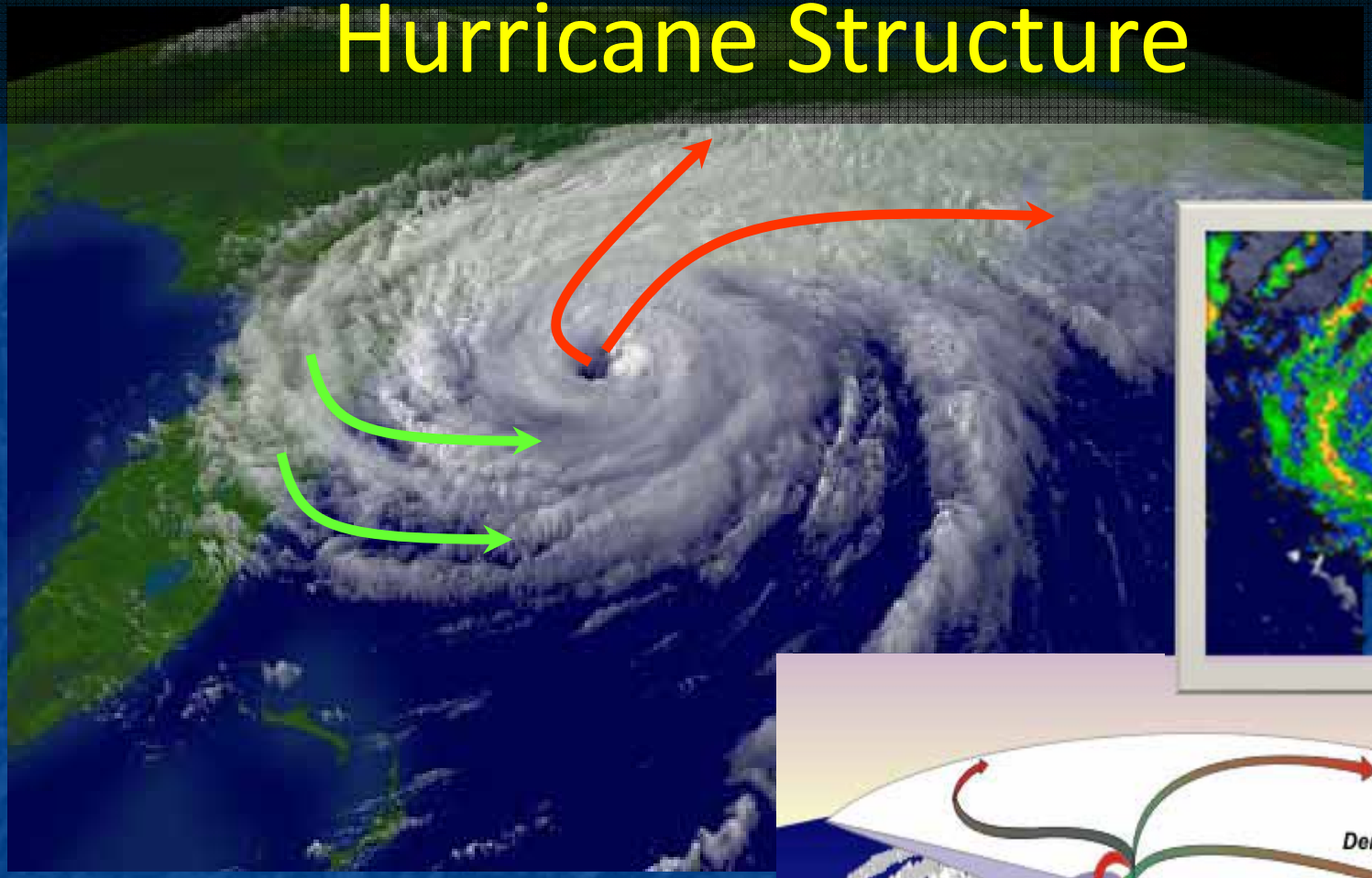
- If snow falls and accumulates, then melts, the total snowfall will be the maximum measured before the snow melts
- If snow falls and melts on contact, never reaching 0.1 inch depth, a trace of snow is recorded.
- Sleet counts towards the snowfall total, but freezing rain does not.

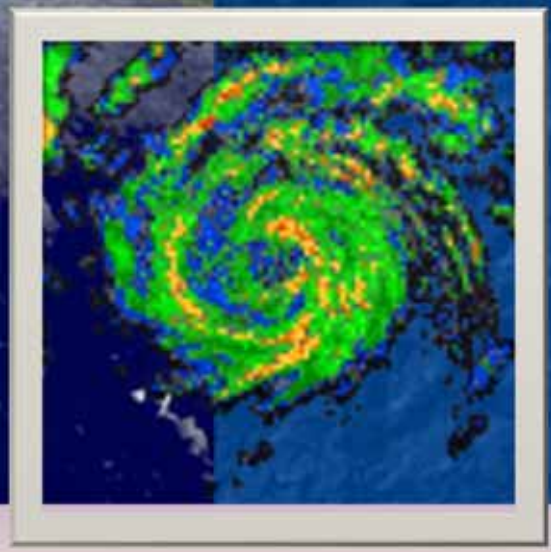
Tropical Weather

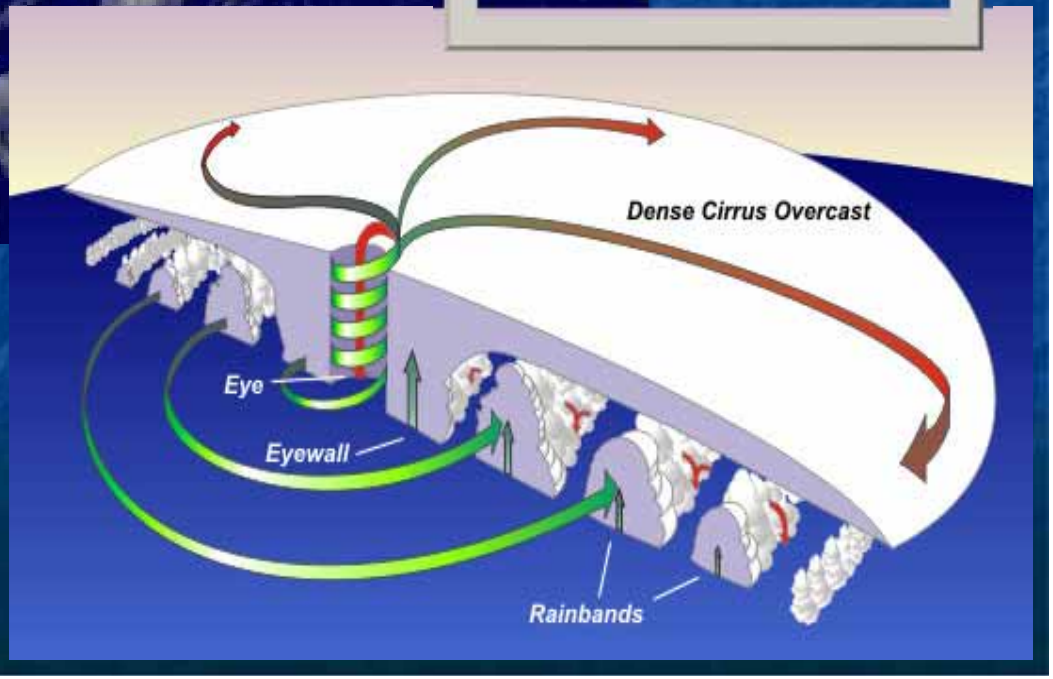
Hurricane Season:

June 1st through November 30th

Hurricane Structure







Hurricane Floyd – Sept 1999

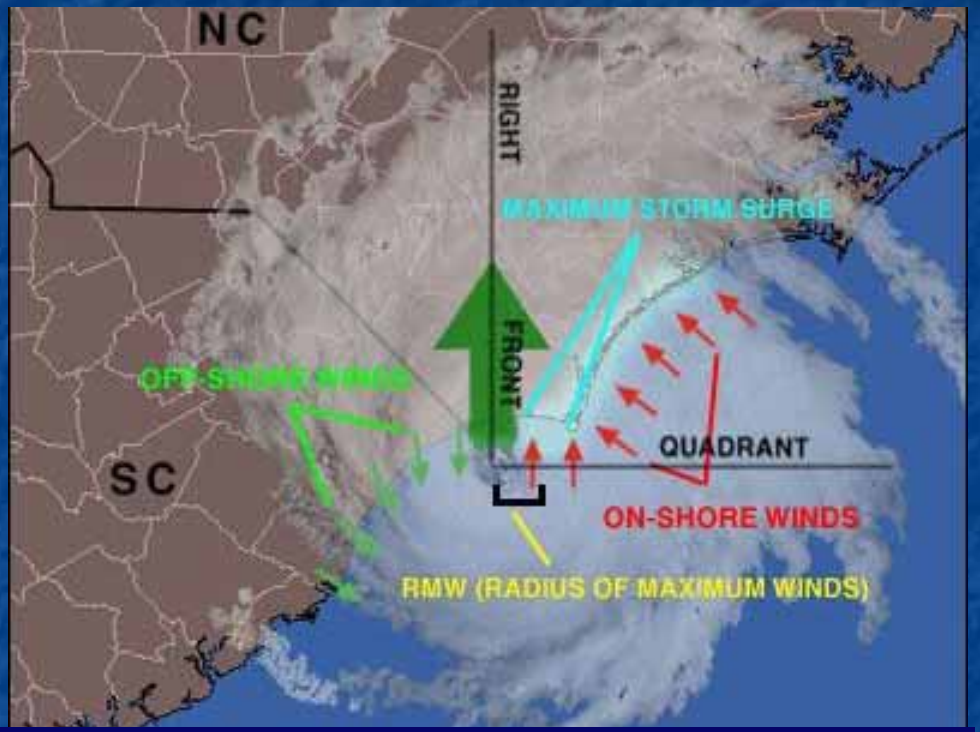
National Weather Service www.weather.gov

Hurricane Threats

Storm Surge, Strongest Winds

STORM SURGE – Abnormal rise in water level associated with the wind & pressure forces around a hurricane.

Highest surge and winds occur in the RIGHT FORWARD QUADRANT close to where the center of the storm makes landfall.



Surge impact is maximized near high tide.

Hurricane Threats

Storm Surge – Chesapeake Bay and Tributaries

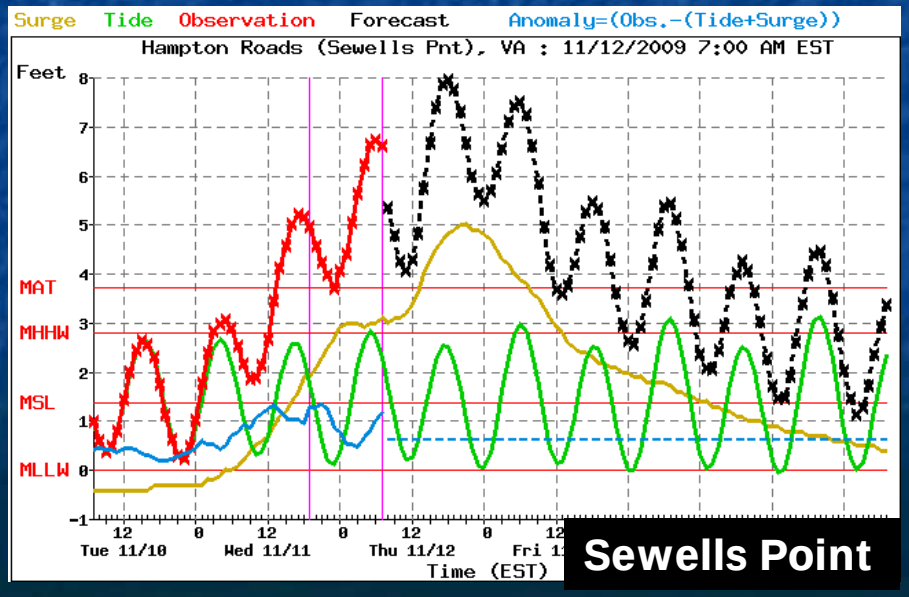
- ** Can also occur with non-tropical systems: When prolonged period of strong, easterly winds prevents the tidal discharge of water out of the Mouth of the Bay. **
- Quite Often "lags" behind the passage of the storm's center and strongest winds, sometimes 12 hours or more!
- 3-5 ft surge occurs on average once every 3 to 6 years; 6-10 ft surge occurs on average once every 10 to 15 years (varies by location).
- Recent notable surges:
- 6 to 9 ft during Hurricane Isabel (2003)
- 6 to 8 ft November Nor'ester (2009).

- Flooding is not always "Tidal". On occasion, maximum surges during times of low tide can still cause significant coastal flooding!

Storm Surge Damage

November Nor'easter 2009

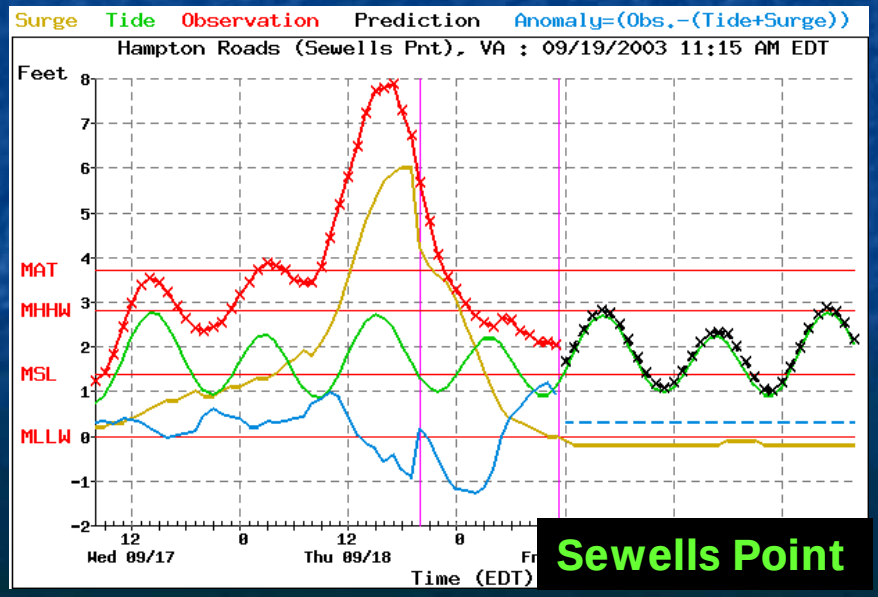
Isle of Wight – Morgarts Beach Rd



Sewells Point

Hurricane Isabel 2003

Near Gloucester



Sewells Point

National Weather Service

National Hurricane Center

weather.gov

Home | News | Organization | Search | Go

Local forecast by "City, St" or "ZIP" Go

Alternate versions
Text-only | PDA | Cell

Get Storm Info
Satellite | Radar
Aircraft Recon
Advisory Archive
Experimental
Mobile Products
E-mail Advisories
Audio/Podcasts
GIS Data | RSS
Help with Advisories

Marine Forecasts
Atlantic and E Pacific
Analysis Tools
Help with Marine

Hurricane Awareness
Be Prepared | Learn
Frequent Questions
AOML Research
Hurricane Hunters
Saffir-Simpson Scale
Forecasting Models
Eyewall Wind Profiles
Glossary/Acronyms
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Breakpoints

Hurricane History
Seasons Archive
Forecast Accuracy
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The NCEP Centers

Contact Us – Help

USA.gov

Top News of the Day.....*view past news*

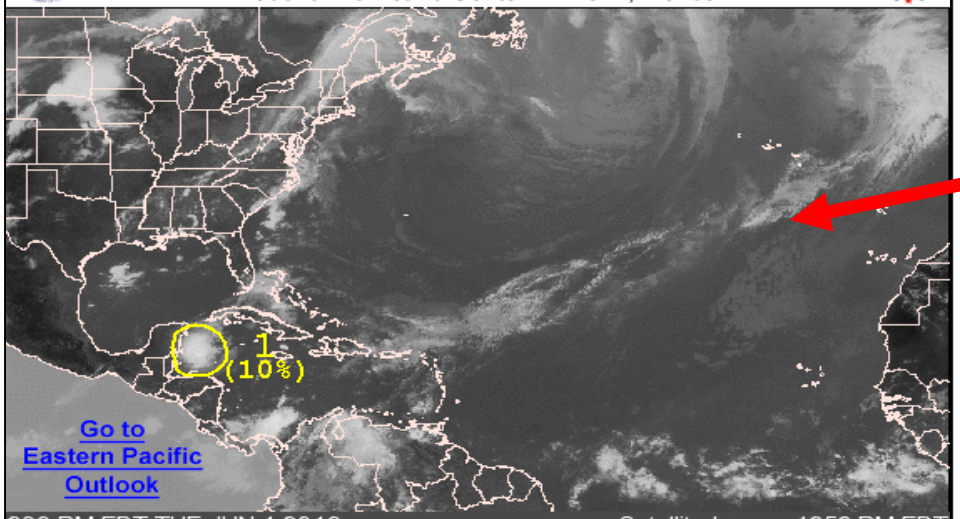
Last update Sat, 7 Feb 2009 02:13:19 UTC

- The Tropical Cyclone Report for Hurricane Ike is available....download the PDF
- 2008 Atlantic Hurricane Season Sets Records....read NHC summary
- View NOAA's High Resolution Animation of the 2008 Atlantic Hurricane Season

Eastern Pacific | Atlantic

Graphical Tropical Weather Outlook

National Hurricane Center Miami, Florida



200 PM EDT TUE JUN 1 2010 Satellite Image: 1252 PM EDT

Outlined areas denote current position of systems discussed in the Tropical Weather Outlook. Color indicates probability of tropical cyclone formation within 48 hours.

Low <30% | Medium 30-50% | High >50%

Atlantic - Caribbean Sea - Gulf of Mexico

Tropical Weather Outlook – en Español*
TAFB Tropical Weather Discussion – Forecasts and Analyses

There are no tropical cyclones at this time.

Eastern Pacific (out to 140°W)

Tropical Weather Outlook
TAFB Tropical Weather Discussion – Forecasts and Analyses

There are no tropical cyclones at this time

www.nhc.noaa.gov

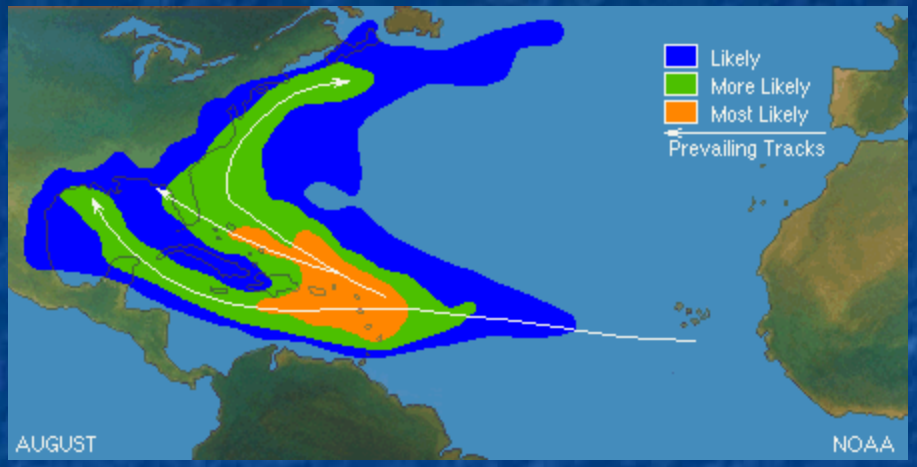
Any active storms will display on map

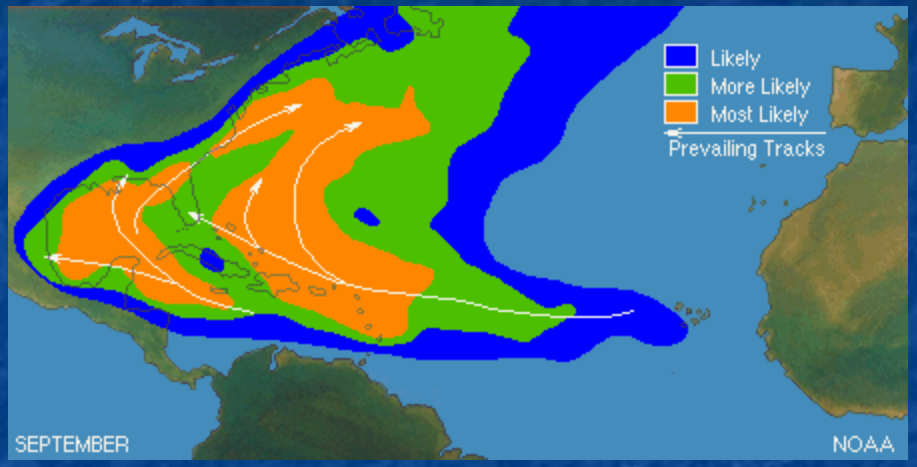
National Weather Service • Since 1870

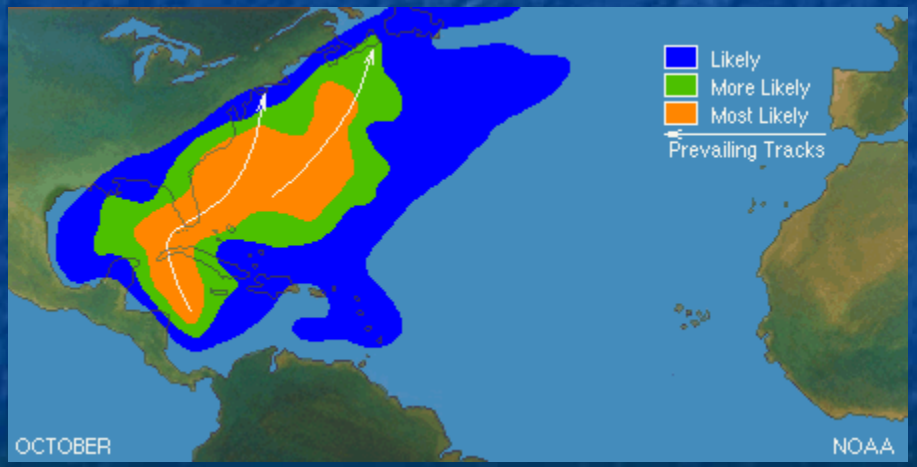
Hurricanes in Virginia

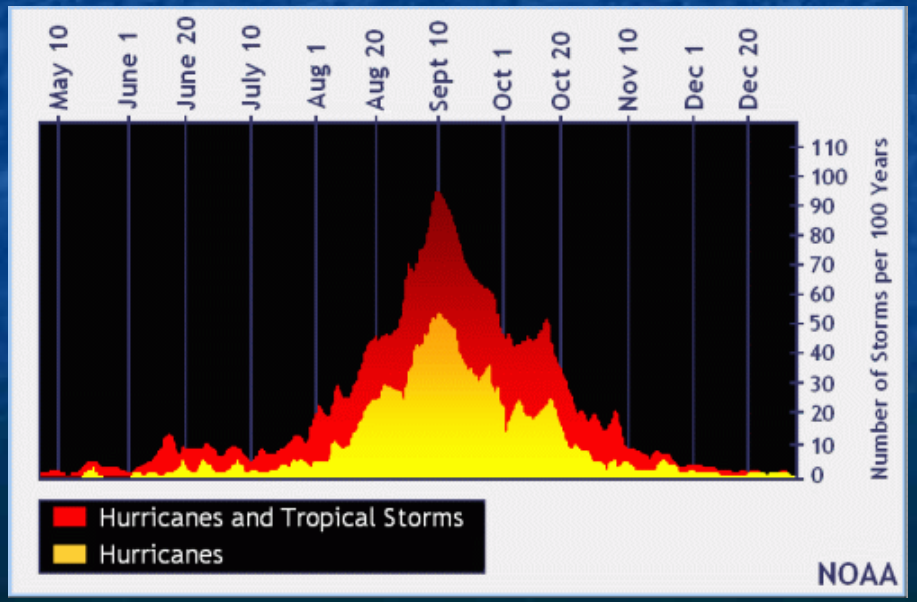
- Irene (2011) – Inland and Coastal
- Hanna (2008) – Inland and Coastal
- Ernesto (2006) – Inland and Coastal
- Gaston, Ivan, Frances (2004) – Mainly Inland
- Isabel (2003) – Inland and Coastal
- Floyd (1999) – Coastal and Inland
- Camille (1969) – Inland****
- Donna (1960) – Coastal only
- Hazel (1954) – Inland and Coastal
- 1933 Hurricane – Inland and Coastal
- 1749 Hurricane – Willoughby Spit

Typical Hurricane Tracks by Month



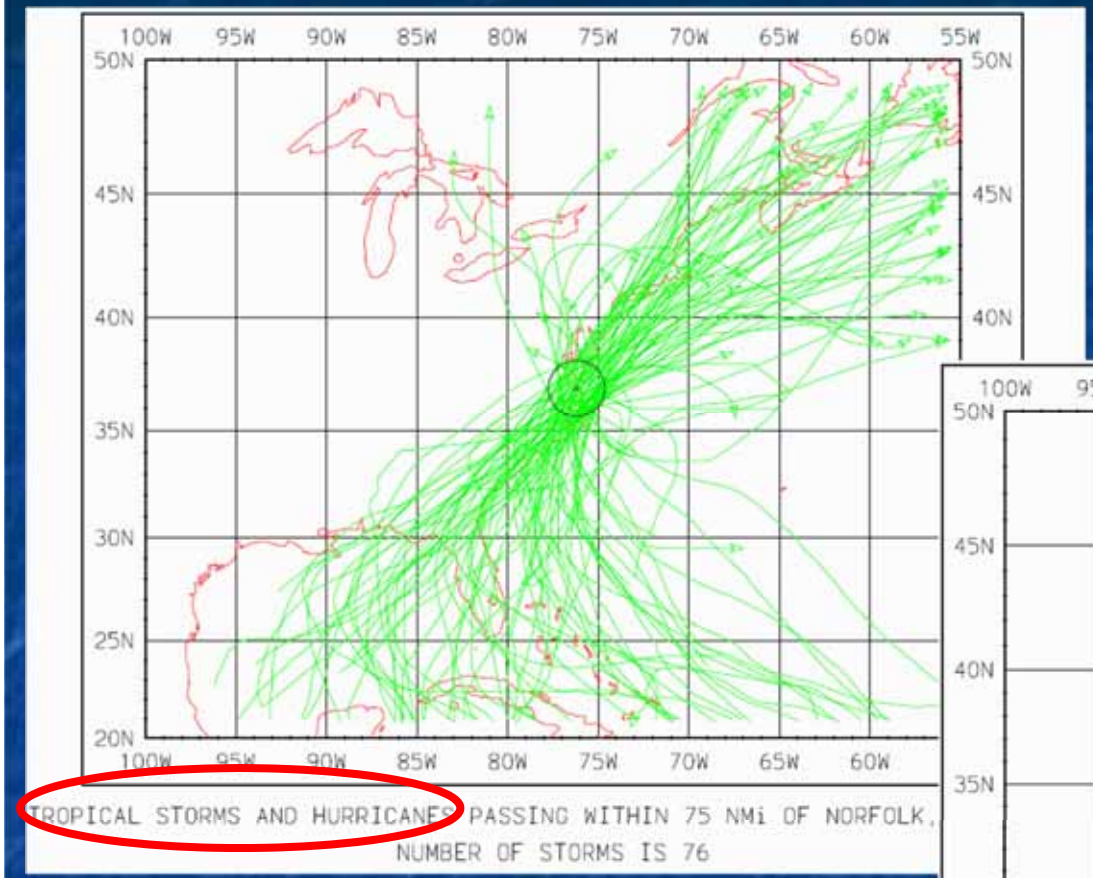


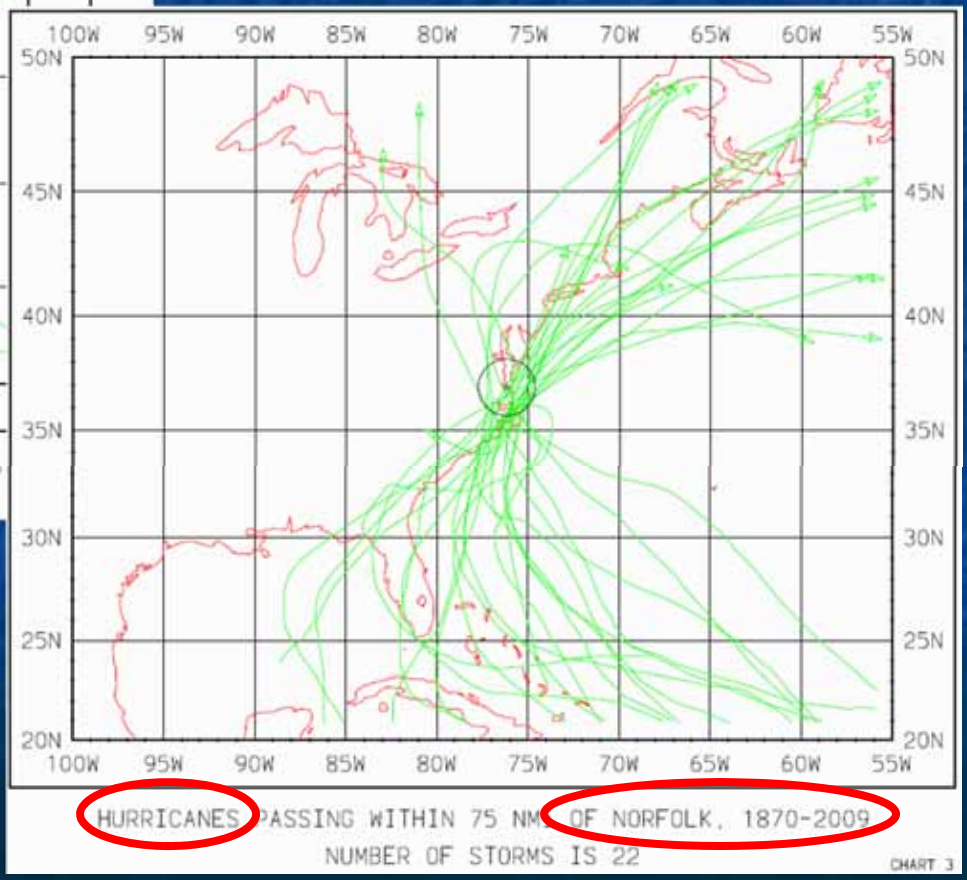




National Weather Service www.weather.gov

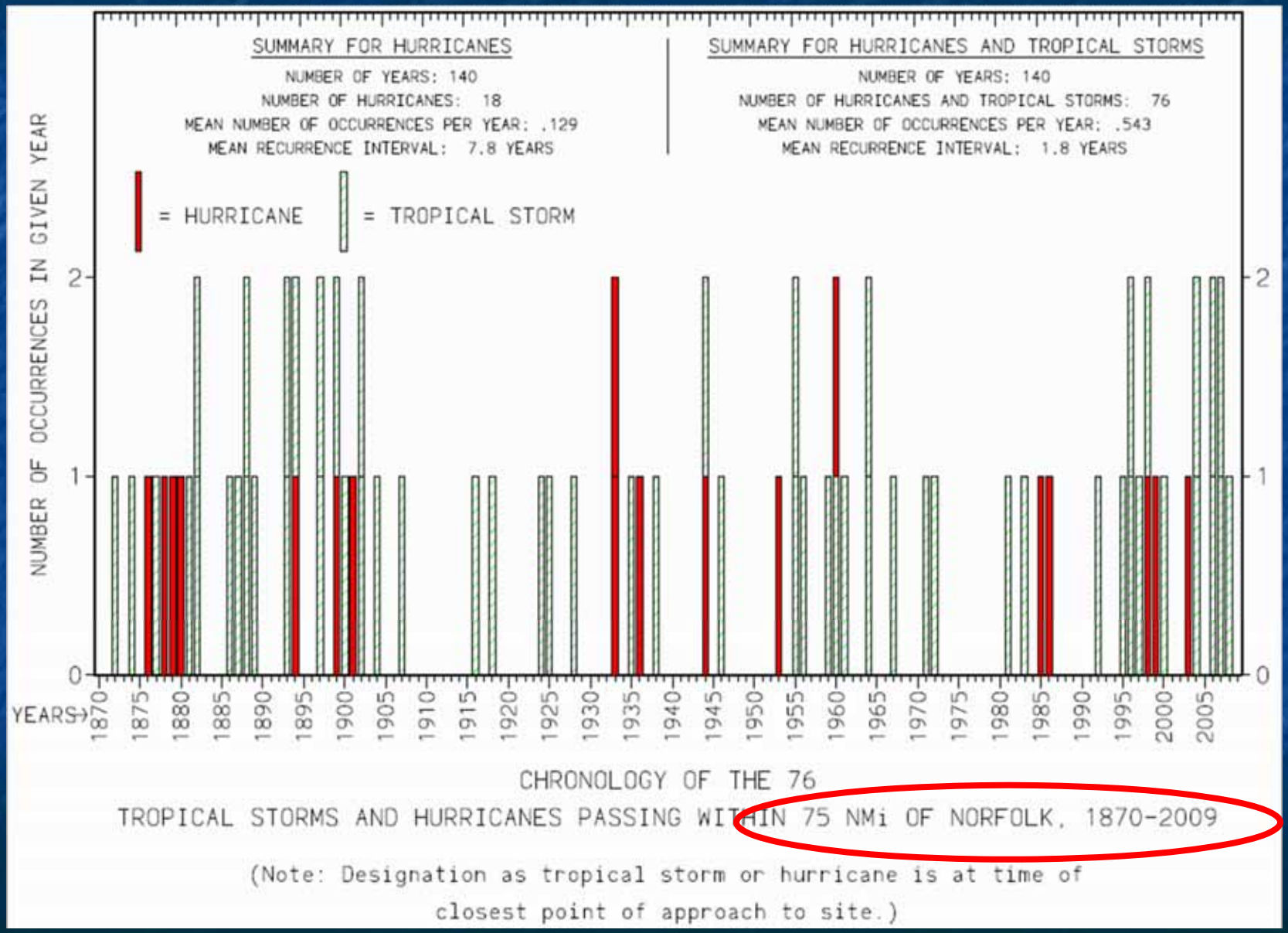
SE Virginia Hurricane Climatology



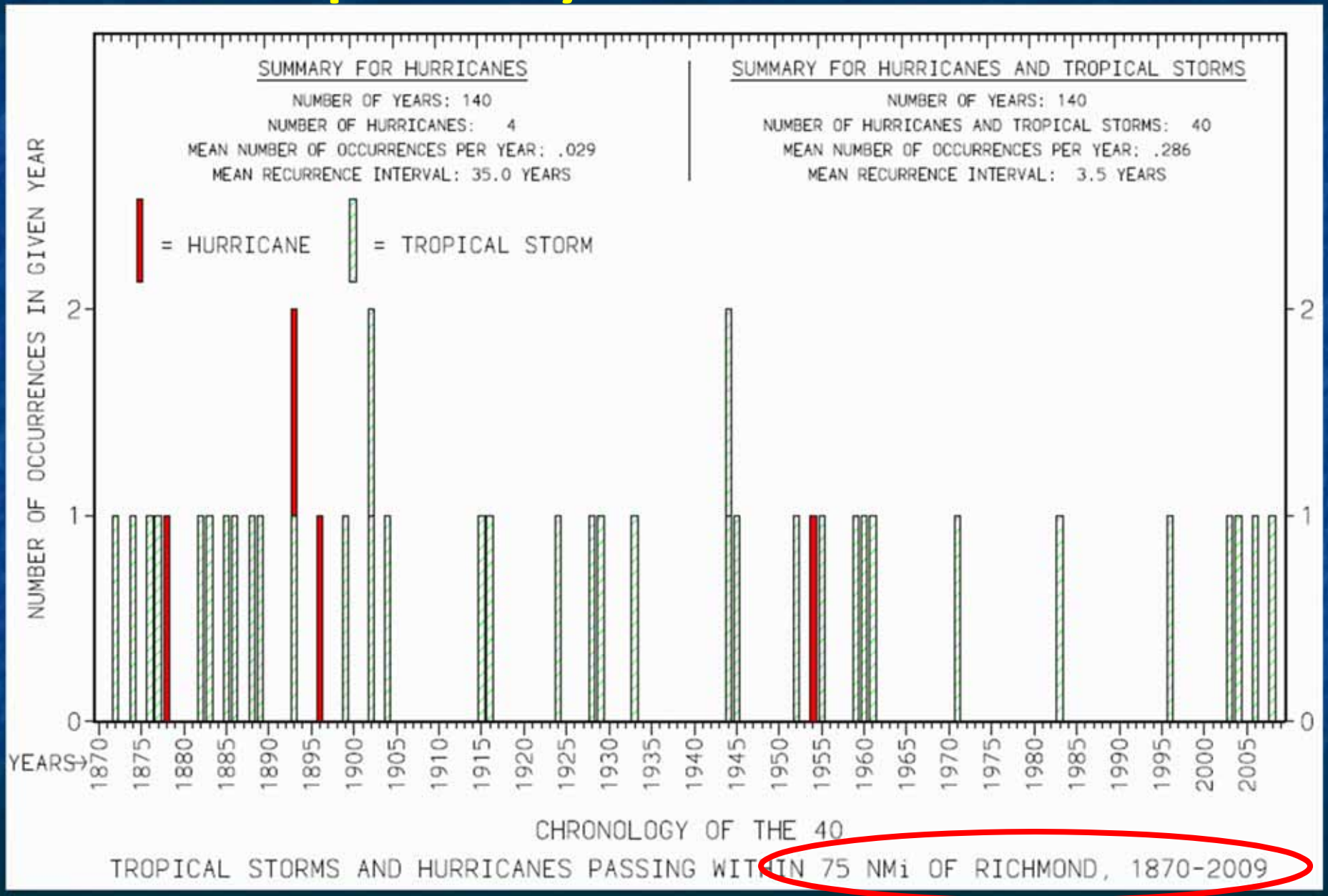


National Weather Service www.weather.gov

Frequency of Hurricanes



Frequency of Hurricanes



Spotter Cards Phased out in 2013

- Course completion certificates now online
- Go to: www.erh.noaa.gov/akq/spotterinfo/nwsakq_bsc2.pdf
- Enter the password: **akqskywarn**

(no spaces)

- Complete Session Certificate
- These instructions available on your SKYWARN CD!

The End

Time to Relax